(White Book)

Defense Nuclear Agency
FY 1997 Budget Estimates

Program Document

Research, Development, Test and Evaluation, Defense-Wide

(Support Congressional Budget Estimates)
March 1996

BUDGET JUSTIFICATION FOR PROGRAM ELEMENTS OF

THE DEFENSE NUCLEAR AGENCY

RESEARCH AND DEVELOPMENT PROGRAM

FY 1997 Budget Estimates

March 1996

DEFENSE NUCLEAR AGENCY

SPECIAL ACCESS PROGRAMS

Program Element/Project, Title

0602715H/AL, Classified Program

R-2 exhibits not required for this project due to classification.

DEFENSE NUCLEAR AGENCY

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

R-1 LINE ITEM ORDER INDEX

DEFENSE NUCLEAR AGENCY

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

ALPHABETICAL INDEX

DEFENSE NUCLEAR AGENCY
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

RESEARCH PROGRAMS
($ in Thousands)

(THIS SUMMARY IS UNCLASSIFIED)

	FY 1995	FY 1996	FY 1997
Defense Nuclear Agency; PE #0602715H			
6.2 Applied Research	210,793	227,964	195,131
Verification Technology Demonstration; PE #0603711H			
6.3A Advanced Technology Development	34,411	32,527	26,199
Total RDT&E Direct	245,204	260,491	221,330
Reimbursements	13,187	26,056	28,662
Total Program	258,391	286,547	249,992

EXHIBIT R-1

DEFENSE NUCLEAR AGENCY
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

BUDGET ACTIVITY
($ in Thousands)

(THIS SUMMARY IS UNCLASSIFIED)

	FY 1995	FY 1996	FY 1997
BA 2 Applied Research	210,793	227,964	195,131
BA 3 Advanced Technology Development	34,411	32,527	26,199
Total RDT&E Direct	245,204	260,491	221,330
Reimbursements	13,187	26,056	28,662
Total Program	258,391	286,547	249,992

EXHIBIT R-1

DEFENSE NUCLEAR AGENCY
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

FYDP PROGRAM
($ in Thousands)

(THIS SUMMARY IS UNCLASSIFIED)

		FY 1995	FY 1996	FY 1997
0602715H	Defense Nuclear Agency	210,793	227,964	195,131
0603711H	Verification Technology Demonstration	34,411	32,527	26,199
Total RDT&E Direct		245,204	260,491	221,330
Reimbursements		13,187	26,056	28,662
Total Program		258,391	286,547	249,992

EXHIBIT R-1

Research and Development Project Listing
FY 1997 Budget Estimates
March 1996

Program Element: #0602715H
Mission Area: #540 - Defense Nuclear Agency

Title: Defense Nuclear Agency
Budget Activity: Applied Research

($ in Thousands)

Project Number	Title	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001
	President's Budget (2/95)	231,978	242,983	255,832	278,887	288,727	296,230	307,632
	POM Submission	210,792	219,003	201,239	220,906	233,035	235,671	243,252
	Current Budget Submission	210,793	227,964	195,131	212,640	222,693	223,501	228,945
AB	Test & Simulation Technology	65,044	54,482	51,123	55,883	55,777	54,817	53,273
AC	Weapon Systems Lethality	42,161	46,921	40,779	42,304	45,763	48,123	49,066
AE	Weapon Safety & Operational Support	24,980	25,921	27,442	30,499	33,416	34,282	37,109
AF	Weapon System Operability	45,657	43,367	41,861	45,806	48,189	52,684	55,453
AG	Scientific Computations & Information Systems	16,984	18,441	18,178	19,013	19,458	19,278	19,240
AH	Counterproliferation Technical Support	7,877	0	0	0	0	0	0
AI	Hard Target Tunnel Defeat and NTS Sustainment	5,090	8,332	5,801	9,664	10,591	11,946	12,451
AL	Classified Program	0	3,000	2,909	2,407	2,389	2,371	2,353
AM	Counterterrorist Exposives Research	0	4,000	0	0	0	0	0
AN	Thermionics	0	10,000	0	0	0	0	0
AX	TOPAZ International Program	0	8,500	7,038	7,064	7,110	0	0
AY	Bioenvironmental Hazards Research	3,000	5,000	0	0	0	0	0
Total		210,793	227,964	195,131	212,640	222,693	223,501	228,945

Research and Development Project Listing
FY 1997 Budget Estimates
March 1996

Program Element: #0603711H
Mission Area: #540 - Defense Nuclear Agency

Title: Verification Technology Demonstration
Budget Activity: Advanced Technology Development

($ in Thousands)

		FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001
President's Budget (2/95)		36,063	33,971	31,925	33,296	34,961	36,078	36,882
POM Submission		34,411	33,971	27,016	30,480	31,959	33,005	34,878
Current Budget Submission		34,411	32,527	26,199	29,343	30,536	31,299	32,835
Project Number	Title							
CA	Strategic Arms Control Technology	8,043	10,831	8,609	9,154	10,955	11,329	11,470
CB	Conventional Arms Control Technology	13,343	9,314	10,362	10,100	8,208	8,160	8,367
CC	Chemical Weapons Convention Technology	13,025	12,382	7,228	10,089	11,373	11,810	12,998
Total		34,411	32,527	26,199	29,343	30,536	31,299	32,835

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

COST *(In Millions)*	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	Cost to Complete	Total Cost
Total 0602715H Cost	210.8	228.0	195.1	212.6	222.7	223.5	228.9	Continuing	
Project AB Test & Simulation Technology	65.0	54.5	51.1	55.9	55.8	54.8	53.3	Continuing	
Project AC Weapon Systems Lethality	42.1	46.9	40.8	42.3	45.7	48.1	49.1	Continuing	
Project AE Weapon Safety & Operational Support	25.0	25.9	27.4	30.5	33.4	34.3	37.1	Continuing	
Project AF Weapon System Operability	45.7	43.4	41.9	45.8	48.2	52.7	55.4	Continuing	
Project AG Scientific Computations & Information Systems	17.0	18.5	18.2	19.0	19.5	19.3	19.2	Continuing	
Project AH Counterproliferation Technical Support	7.9	0	0	0	0	0	0	Transferred	
Project AI Hard Target Tunnel Defeat and NTS Sustainment	5.1	8.3	5.8	9.7	10.6	11.9	12.4	Continuing	
Project AL Classified Program	0	3.0	2.9	2.4	2.4	2.4	2.4	Continuing	
Project AM Counterterrorist Explosive Research	0	4.0	0	0	0	0	0	Complete	
Project AN Thermionics	0	10.0	0	0	0	0	0	Complete	
Project AX TOPAZ International Program	0	8.5	7.0	7.0	7.1	0	0	Complete	
Project AY Bioenvironmental Hazards Research	3.0	5.0	0	0	0	0	0	Complete	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

A. Mission Description and Budget Item Justification

This program develops the technology base needed to support national security issues relevant to nuclear and other advanced weapons and force application technologies. Program initiatives include the development, upgrade, and maintenance of advanced nuclear weapons effects simulators to address weapon systems operability issues; conventional weapon targeting and strike planning tools for regional contingencies; battle damage prediction/assessment of conventional strikes against fixed hardened facilities; and predictive models for dispersion and transport of hazardous particles generated by attacks of Weapons of Mass Destruction (WMD) facilities. These projects also serve to support sustainment of a core nuclear competence in the national industrial base. Efforts encompass:

- -Support to CINCs in nuclear force structure, logistics and operations.
- -Quantitative assessments of nuclear weapons systems with development and maintenance of nuclear weapons system safety databases.
- -Development, upgrade, and operation of simulators (radiation, blast, thermal, radio propagation and optical/infrared background effects) to characterize operability of military systems during and after exposure to nuclear disturbed environments.
- -Characterization of hardened underground structure designs and vulnerabilities to determine weapon lethality.
- -Determination of nuclear and conventional weapons effectiveness against fixed targets. Emphasis is on targeting technical support, hard target kill capability, and damage assessment methodologies.
- -Utilization of weapons effects information to support development of adaptive targeting methodologies.
- -Support of high-performance computing capability to maintain and upgrade the Agency's predictive codes in radiation hydrodynamics, structural dynamics, and electromagnetic propagation supporting nuclear and conventional weapons effects assessments and their impact on weapon system lethality, operability, and safety.

Information concerning Project AL is classified per DoD Directive 0-5205.7, Para B.2.f.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology - Development of effective, survivable, and economical weapon systems requires a robust testing and simulation capability to validate research and development results and support acquisition managers and decision makers. This project provides the weapons effects testing and simulation capabilities, facilities, and technologies used by the Services, Department of Energy, National Aeronautics and Space Administration and their contractors to evaluate the performance, reliability and operability of systems across the spectrum of hostile environments due to special weapons and nuclear weapons effects and naturally-disturbed space environments. The project also includes the development of new simulators, along with affiliated calculational/analytical tools, decommissioning of old simulators and upgrade of existing simulator facilities to compensate, to the maximum extent possible, for the lack of underground testing. This effort relies on the development of Testable Hardware and Above Ground Testing/Underground Testing (AGT/UGT) correlation, funded under Project AF, to allow hardness verification using only nuclear weapons effects simulators.

This program includes the development, construction and checkout of the new DECADE simulator and upgrade of current operational simulators including x-ray simulators, radio and radar propagation effects simulators, and infrared and optical scene generators. Also included is the development of a long-term simulator strategy to include provisions for the consolidation and shutdown of several DNA simulators and/or test centers. A joint program with Sandia National Laboratories will continue to explore the development of pulsed power and switching technologies applicable to support projected test requirements. This project also supports the development of innovative enabling technologies in high explosive (HE) effects testing, pulsed power, storage and switching, radiation sources, debris shields, and high-energy-density capacitors. Development and demonstration of Non-Ideal Airblast (NIAB) simulation capability, and characterization and optimization of the Large Blast/Thermal Simulator are included in this effort. The simulation facilities developed and operated by this project support the DoD test requirements for: (1) x-ray, gamma-ray, electromagnetic pulse (EMP) and thermal radiation; and (2) high altitude source region and EMP effects.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

This project leverages fifty years of DNA nuclear and conventional testing expertise to investigate weapons effects and target response related to the use of nuclear and advanced conventional weapons by proliferate nations. These requirements are met by conducting predictive analyses and accomplishing full- and sub-scale tests. Specific focus is in the weapon-target interaction with fixed hardened facilities; including hardened above-ground bunkers, cut-and-cover facilities and deep underground tunnels. This effort supports the Services' requirements for hard target defeat testing development and munitions effectiveness evaluation. This project also accomplishes the target defeat assessment for precision, guided and special weapons for WMD-related targets and provides the testbeds for weapons lethality testing accomplished in Project AC. Specific activities include test bed design and construction, instrumentation and data collection, test coordination and execution, and post-test analysis and documentation.

FY 1995 Accomplishments

Test & Simulation ($32,287K)

- Radiation Facility Operations
  - Began consolidation of facilities.
- DECADE Facility
  - Building construction to house DECADE simulator 95% complete.
  - Completed plans for installation of simulator and data acquisition system.
- High Explosive (HE) Simulator Development and Test Support
  - Maintained DNA Permanent High Explosive Test Site (PHETS) at White Sands Missile Range (WSMR), New Mexico.
  - Provided testbeds and instrumentation for 23 hard target response and weapon/target interaction tests.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1995 Accomplishments

Communications & Sensor Effects Simulation

Continued development of the Radar Nuclear Effects Corrupter and Simulator (RNECS) for Theater High Altitude Area Defense (THAAD) Radar Program.

Continued development of 512x512 IR emitter array for Nuclear Optical Dynamic Display Simulator (NODDS).

Provided Nuclear Effects Links Simulator (NELS) test support to the Universal Modem Program and the U.S. SPACECOM/STRATCOM TW/AA operability assessment.

Continued development of the Advanced Channel Simulator (ACS) to replace the twenty year old NELS that supports state-of-the-art communication systems and is no longer maintainable.

Tested THAAD focal plane in simulated nuclear environment using NICS/NODDS.

Advanced Pulsed Power & Radiation Simulator R&D

Began test validation of opening switch, power flow, and radiation sources.

Began diagnostic and debris mitigation efforts.

Alternative Simulation Concepts

Began ion beam fidelity evaluation.

Began laser driven plasma utility as Nuclear Weapons Effects (NWE) simulator.

Blast/Thermal Simulator Operations and Development

Initiated facility operations (IOC).

Performed facility characterization.

Integrated enhanced Thermal Radiation Source (TRS) into LBTS.

Developed LBTS calculational models.

Application of Nuclear Weapons Expertise ($17,679K)

Communications & Sensor Effects Simulation

Provided NELS test support to the Universal Modem Program.

Supported development of Advanced Channel Simulator (ACS) for evaluation of state of the art communication systems in nuclear disturbed atmospheres.

Provided test support to DNA Sensors program with Nuclear Infrared Clutter Simulator (NICS).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Exploratory Development - BA	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1995 Accomplishments

HE Simulator Development and Test Support

Provided testbeds and instrumentation for ground shock, protective design and anti-penetration tests.

Provided testbeds and instrumentation for 14 tests evaluating hard target response to smart weapons and penetrating weapons.

Provided test facilities for thermal effects to THAAD at Tri-Service Thermal Radiation Test Facility (TTRTF), supported Navy thermal testing at Kirtland Air Force Base.

Weapon/Target Interaction ($330K)

HE Simulator Development and Test Support

Developed new simulation techniques to meet customer requirements.

Evaluated smart fuze optimal point of burst.

Evaluated innovative hard target kill techniques with single aimpoint multiple strike.

US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($429K)

HE Simulator Development and Test Support

Constructed Weapons of Mass Destruction (WMD) storage facility mockup for Counter-proliferation (CP) testbed at PHETS.

Designed half-scale structures for testing of weapon lethality and WMD collateral effects.

Constructed highly instrumented hard targets to support evaluation of precision guided munitions terminal effects.

Communications & Sensor Effects Simulation

Performed Ballistic Missile Defense Organization (BMDO) THAAD focal plane array test in combined nuclear effects simulated environment.

Initiated communication/radar/atmospheric effects simulator participation in operability assessment/warfighting (JWIDS 95) exercises.

Nuclear/Designated Advanced Weapons Effects ($4,158K)

Blast/Thermal Simulator Operations and Development

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1995 Accomplishments

Completed LBTS characterization and prepared for Thermal Radiation Simulator (TRS) installation in the LBTS for Final Operational Capability (FOC).
Developed test methodology, instrumentation and test techniques.
Initiated investigation of Non-Ideal Airblast effects and simulator techniques

Radiation Simulators ($9,663K)

Radiation Facility Operations
Operated four radiation Test Centers (TC) containing 10 simulators.

Radiation Facility Upgrade
Assessed potential facilitation for laser plasmas simulator development.
Upgraded Modular Bremsstrahlung Source (MBS) to meet required performance.
Consolidated technology and equipment.
Fielded fast-risetime technology in existing simulators.

Radiation Facility Modernization
Began reliability improvements on Phoenix, Casino, and Double Eagle.
Assessed the utilization of ion-beam and e-beam simulators for cold x-ray simulation.
Began optimization of existing debris shields and development of multi-line plasma source.
Began standardization of diagnostics.

EMP Simulator Operations and Support
Completed MILSTAR facility characterization, Air Launched Cruise Missile testing and MILSTAR electromagnetic pulse tests.

Test Facility Decommissioning ($498K)

Radiation Facility Shutdown
Began equipment relocation in support of Test Center shutdown.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1996 Plans

Test & Simulation ($21,517K)

Radiation Facility Operations
- Continue consolidation of facilities.

DECADE Facility
- Complete installation of data acquisition and major simulator support systems.

HE Simulator Development and Test Support
- Provide HE simulation development and test support.
- Maintain the test facilities at WSMR and at Kirtland AFB.

Communications & Sensor Effects Simulation
- Continue RNECS development.
- Complete 512x512 NODDS emitter array and incorporate in the Nuclear IR Clutter Simulator (NICS).
- Continue ACS disturbed atmospheric environment communication simulator development.

Advanced Pulsed Power & Radiation Simulator R&D
- Begin debris shield and diagnostic testing.
- Complete insulator and longer life output switch testing.
- Demonstrate inductive energy driven soft x-ray sources.

Blast/Thermal Simulator Operations and Development
- Achieve LBTS FOC and continue Tri-Service test facility operations and customer test support.
- Develop and demonstrate NIAB Simulation capability on LBTS.

Applications of Nuclear Weapons Expertise ($16,000K)

Communications & Sensor Effects Simulation
- Provide NELS test support to the High Capacity Trunk Radio (HCTR) Program.
- Utilize NELS to evaluate Milstar connectivity for the TW/AA assessment.
- Continue ACS development.
- Continue tests of the Universal Modem; continue tests of DNA Sensors program.

Precision Weapons Testing
- Support Air Force, Army and Navy hard target interaction testing.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1996 Plans

HE Simulator Development and Test Support
- Provide analytical support to ground shock, anti-penetration and lethality tests.
- Develop NIAB and LBTS calculational model.

Weapon/Target Interaction ($528K)

HE Simulator Development and Test Support
- Provide testbeds and instrumentation for ground shock, protective design, anti-penetration, and weapons lethality.

Precision Weapons Testing
- Rehab old target structures to support additional testing.

US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($1,212K)

HE Simulator Development and Test Support
- Finish construction of third WMD facility mockup for CP testbed at PHETS.
- Construct half-scale structure for testing of weapon lethality and WMD collateral effects.

Blast/Thermal Simulator Operations and Development
- Execute NIAB effects demonstration program for Army.
- Test Navy radomes and ship masts.

Communications & Sensor Effects Simulation
- Evaluate communication system and advanced focal planes for Space Based Infrared System (SBIRS).
- Evaluate National Missile Defense (NMD) focal planes, communications and radar systems.
- Conduct communication/radar/atmospheric effect simulator hardware-in-the-loop (HWIL) testing for operability.

Nuclear/Designated Advanced Weapons Effects ($4,037K)

Blast/Thermal Simulator Operations and Development
- Initiate preplanned product improvement program for LBTS.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1996 Plans

Develop calculational and analytical tools for NIAB environment, support of test program.

Radiation Simulators ($7,246K)

Radiation Facility Operations

Operate two test centers containing six radiation simulators.

Radiation Facility Upgrade

Characterize and document e-beam source on MBS.
Improve shot repeatability on Double Eagle.
Improve power flow on Phoenix.
Transfer improved debris shields technology.

EMP Simulator Operations and Support

Continue customer support and upgrade EMP pulser diagnostics and control station.

Test Facility Decommissioning ($3,942K)

Radiation Facility Shutdown

Closeout Aurora, Blackjack 3 and 5, and one MBS simulator.
Evaluate environmental characteristics.
Begin shutdown of selected facilities and continue to relocate equipment.

Nuclear Weapons Technical Assistance Publications ($1,855K)

HE Simulator Development and Test Support

Develop standardized test and analysis methodology and documentation techniques.

Blast/Thermal Simulator Operations and Development

Document non-ideal blast phenomenology LBTS test results.

FY 1997 Plans

Test & Simulation ($17,689K)

Radiation Facility Operations

Operate radiation simulators.

DECADE Facility

Begin facility integration and simulator installation.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1997 Plans

HE Simulator Development and Test Support
- Provide HE simulation infrastructure and test support.
- Maintain PHETS facility at WSMR and Chestnut Site at Kirtland AFB.

Communications & Sensor Effects Simulation
- Complete RNECS development and begin initial operational tests.
- Complete ACS development and begin initial operational tests.
- Evaluate advanced sensor focal planes in NICS.
- Advanced SATCOM Simulation Test Support to Defense Satellite Communication System (DSCS) Replenishment.

Advanced Pulsed Power & Radiation Simulator R&D
- Complete Xenon model for enhanced radiation modeling.
- Demonstrate radiation diagnostics for DECADE.
- Demonstrate debris shields for transfer to DECADE facility.

Blast/Thermal Simulator Operations and Development
- LBTS operation and maintenance, blast/thermal development testing and continue operation of Tri-Service test facility.

Blast and Shock Phenomenology
- Conduct test to develop analytical techniques.

Applications of Nuclear Weapons Expertise ($16,110K)

Communications & Sensor Effects Simulation
- Evaluate advanced sensor focal planes.
- Provide ACS test support to the Universal Modem and MILSTAR Programs.
- Participate in HWIL testing introducing IR sensors and nuclear weapon effects.

Precision Testing
- Support Air Force, Army and Navy hard target interaction testing.

HE Simulator Development and Test Support
- Provide analytical support to anti-penetration weapon/target interaction and lethality from enhanced payloads.

Weapon/Target Interaction ($848K)

HE Simulator Development and Test Support

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1997 Plans

Execute ground shock, structural response, protective design, anti-penetration, and lethality tests.

Precision Weapons Testing

Complete 1/2 scale structure to support extensive testing for weapon lethality and target response.

US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($482K)

HE Simulator Development and Test Support

Build unique, multi-purpose, hard target testbed to evaluate designated advanced weapon enhancements.

Blast/Thermal Simulator Operations and Development

Evaluate advanced thermal test needs/incorporate fidelity improvements.

Continue Army test sequence.

Communications & Sensor Effects Simulation

Advanced SATCOM Simulation Test Support to Defense Satellite Communication System (DSCS) Replenishment.

Continue communication/radar/atmospheric effects simulator participation in operability assessment/warfighting exercises.

Evaluate Upgraded Early Warning Radar (UEWR) operability for NMD.

Nuclear/Designated Advanced Weapons Effects ($4,224K)

Blast/Thermal Simulator Operations and Development

Continue improvements to develop analytical techniques for analysis of systems operations and characterization data.

Complete NIAB test program.

Radiation Simulators ($8,913K)

Radiation Facility Operations

Operate remaining radiation simulators.

Radiation Facility Upgrade

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AB - Test & Simulation Technology (cont'd)

FY 1997 Plans

Begin DECADE preplanned product improvement program for low endpoint voltage operation.

EMP Simulator Operations and Support

Continue customer support and analyze, modify and initiate facility waveform improvement.

Test Facility Decommissioning ($2,857K)

Radiation Facility Shutdown

Continue relocation of selected simulators and begin preparations for closure of vacated facilities.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AC - Weapons Systems Lethality - The continuing potential for significant regional conflicts has renewed interest in the topic of deterrence and its relationship to both nuclear and precision guided conventional weapons. As important nuclear force structure decisions are weighed, a renewed emphasis on the effectiveness and limitations of advanced conventional weapons, as well as their nuclear counterparts, has emerged. Relying upon core competencies associated with nuclear effects and target response, this project addresses the effectiveness, or lethality, of the full spectrum of conventional and nuclear weapons. The target base includes hard and super-hard underground facilities, fixed surface facilities, and special targets. The program relies extensively on laboratory scale experiments, intermediate and full scale field tests, operational test data, and advanced numerical methods to quantify functional and physical damage criteria and collateral effects. Project results will be provided to operational planners through analytic prediction tools, multimedia hypertext databases, and technical manuals. Central to this support is an automated expert system to assist in pre-strike target planning and post-strike battle damage assessment. Technology developed in this project will also enable civil agencies to assess engineering designs to mitigate direct and collateral damage from terrorist attacks such as occurred at the Oklahoma City, Alfred P. Murrah, Federal Building. On a broader scale, improvements in weapon effects and target response codes will be used to supplement initiatives to upgrade and expand physics-based modeling and simulation in the Weapon Safety & Operational Support (Project AE) technology developments in support of Distributed Interactive Simulation (DIS). These improved codes include: coupled finite difference-finite element structure-medium interaction, groundshock propagation in jointed and/or layered media, and coastal underwater explosion environments. The understanding of weapon-target interaction resulting from this project will assist in generating weapon system requirements against the rapidly changing worldwide target base and provide a quantitative basis for contingency operations against high value targets. It will also improve the understanding of target/weapon interaction and its consequences for battle damage prediction and assessment. This project also includes the Electro-Thermal Chemical (ETC) gun advanced technology and projectile lifting body programs per MOA with the Navy; ETC technologies for the direct-fire applications, per MOA with the Army, and the development of high energy density capacitors for compact energy storage and mobile weapon platforms.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AC - Weapons Systems Lethality (cont'd)

Project AB, Test & Simulation Technology, provides the testbeds to support weapons lethality tests in this project. The DoD counterproliferation initiative prompted a realignment of funding and efforts in non-nuclear collateral effects, underground structures, enhanced payloads, and weapons system lethality technologies developed in both conventional and electromagnetic lethality programs to the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs' counterproliferation program.

FY 1995 Accomplishments

Weapon System Lethality ($15,131K)

Weapon Effects

Characterized localized structural failure caused by large weapons. Validated Munitions Effects Assessment (MEA). Completed electronic Joint Munitions Effectiveness Manual (JMEM).

Nuclear Collateral Effects

Fielded HASCAL software tool as user-in-the loop development item for assessing fallout and hazard concentration footprints.

Developed nuclear/biological/chemical (NBC) knowledge database on CD-Rom.

Conducted experiments to validate expulsion model, a critical element of collateral effects prediction.

Developed routine for Air Force Dial-In Service (AFDIS) weather data access.

Hard Target Response

Executed, using Project AB testbeds, one protective design, five anti-penetration, and 21 lethality tests to increase knowledge of munitions effectiveness against hardened structures.

Executed contaminants/corrosives diffusion experiment.

Conducted large-scale High Temperature Accelerant phenomenology testing.

Electro-Thermal Chemical Gun ($9,465K)

Demonstrated repeatability with five standard projectiles at 18.2 MJ with 0.42 percent standard deviation in velocity.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AC - Weapons Systems Lethality (cont'd)

FY 1995 Accomplishments

Continued to support Navy Advanced Technology Demonstration for Naval Surface Fire Support (NSFS) (5-inch gun), including participation in field tests at White Sands Missile Range (WSMR).

Down-selected advanced/promising power source materials for further development.

Supported advanced Electro-Thermal Chemical testing for Army direct fire applications.

Weapon Target Interaction ($5,357K)

Sea-Based Structures

Conducted mine-warfare ship vulnerability model tests.

Terrorist Attacks on Structures

Supported National Academy Study on Counter-Terrorism; mitigation of bomb damage to public buildings through prudent design practices.

Computational Structural Dynamics

Validated computer codes for advanced soil island to simulate various soil conditions and how these soils respond to simulated nuclear blast.

Underground Structures

Completed precision tests on sedimentary rock to obtain precise understanding of weapon-target interaction.

Mothballed Fort Knox underground test facility.

EM Lethality ($3,265K)

Conducted laboratory demonstration test using low power prototype sources.

Conducted proof-of-principle hardened facility test.

Weapon System Effects ($8,941K)

Structural Dynamics

Completed conventional weapons tests on tunnel portals in hard rock.

Systems Effects

Demonstrated virtual interactive target at modeling and simulation conference.

Delivered a model which determines aircraft response to a dusty environment.

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Project AC - Weapons Systems Lethality (cont'd)

FY 1995 Accomplishments

Explosive Effects

- Completed weather and transport model; initiated combat weather system model.
- Completed half-scale biological storage testing to determine collateral effect from conventional weapons attack.
- Initiated Army Advanced Concepts Technology Demonstration (ACTD) Multiple Rocket Launcher (MRL) geotechnical characterization and model development (NEMESIS, and Personal Computer Ground Shock).
- Completed Diamond Fortune underground test data analysis.
- Initiated development of weapon-specific energy coupling curves.

FY 1996 Plans

Nuclear Weapons Effects Phenomenology ($3,000K)

Thermal and Mechanical Phenomenology

- Perform DoD assessment of the nuclear stockpile's capability to meet mission requirements with respect to thermal and mechanical effects without testing.

Weapon Output

- Develop a weapons output library for each fuzing system in the stockpile for use in weapons effects models.
- Complete source output calculations/W76 (nuclear weapon model) Coupling Curve

Aircraft Survivability Program

- Complete engine algorithm development for dusty environments.
- Transfer advanced test and analysis capability developed from nuclear weapons to conventional weapons issues.

Application of Nuclear Weapons Expertise ($13,503K)

Weapon Effects

- Execute, using Project AB testbeds, six lethality tests to evaluate lethality issues associated with hardened fixed structures.
- Develop cumulative damage models for Munitions Effects Assessment.

Computational Structural Dynamics

- Complete discrete element boundary model.

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Project AC - Weapons Systems Lethality (cont'd)
FY 1996 Plans

Complete linked EPIC/CTH calculational codes.

Military Capacitors

Continue selected material development to fabricate high energy density prototypes.

Enhanced Payloads Options ($925K)

Thermal and Mechanical Phenomenology

Provide Non-Ideal Airblast analytical support to the response testing of Army battlefield equipment.

Weapon/Target Interaction ($5,772K)

Hard Target Response

Publish Tri-Service Design and Analysis of Hardened Structures (DAHS) manual.

Execute, using Project AB testbeds, one protective design, six anti-penetration, and six lethality tests to evaluate survivability issues associated with hardened fixed structures.

Thermal and Mechanical Phenomenology

Develop targeting methodology based on Nevada Test Site and Norway test databases for tunnel portal closure attacks.

Nuclear Collateral Effects

Release Hazard Assessment and Consequence Analysis (HASCAL), version 2.0.

Special Targets

Develop targeting methodology for hard target and tunnel defeat mechanisms.

Bomb Damage Assessment ($1,001K)

Underground Facilities Sensing

Support demonstrations of battle damage assessment sensors/data fusion on Lare Test Structures-II tests.

US/Allied Survivability and Operability in Nuclear/Designated Advanced Weapon Environments ($2,896K)

Weapon Effects

Update Joint Munitions Effectiveness Manual, Structural Response.

Update DAHS manual.

Develop expert design advisor.

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Project AC - Weapons Systems Lethality (cont'd)

FY 1996 Plans

Electro-Thermal Chemical Gun ($7,716)

Weapon Effects

Begin the transfer to the U.S. Army and Navy for their Airborne Tactical Data System (ATDS) and follow-on Engineering and Manufacturing Development (EMD).

Complete wind tunnel testing of projectile designs.

Nuclear/Other Advanced Weapons Effects ($11,503K)

Special Targets

Develop and apply computerized weapons effects models for the defeat of hard targets and tunnels.

Thermal and Mechanical Phenomenology

Develop and apply computerized weapons effects model for attacking multiple rocket launchers for the Joint Precision Strike Demonstration (JPSD) Army ACTD.

Electromagnetic Lethality

Construct High-Power RF test system.

Complete lab demonstration.

Begin alternate source development.

Continue foreign asset testing.

Explore High Power Microwave (HPM) associated technology designed for Command and Control Warfare (C^2W).

Modeling and Simulation ($605K)

Expand the Virtual Interactive Target to include weapons storage facilities, other hard targets, and integrate operational bombing ranges for NAVAIR.

FY 1997 Plans

Nuclear Weapons Effects Phenomenology ($1,913K)

Thermal and Mechanical Phenomenology

Develop requirements statements for nuclear weapons capabilities to achieve special target effects including very hard or very deep targets.

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Project AC - Weapons Systems Lethality (cont'd)
FY 1997 Plans

Weapon Output
Develop a weapons output library for potential proliferants' weapons for use in weapons effects models.
Complete W78 and W88 (nuclear weapon models) Coupling Curves

Aircraft Survivability Program
Complete analysis tool for USSTRATCOM to assess aircraft dust survivability for planned Single Operation Plan (SIOP) routes.

Application of Nuclear Weapons Expertise ($11,216K)

Weapon Effects
Start Design and Analysis of Hardened Structures.

Expand Munitions Effects Assessment software to additional fixed targets and weapons.

Computational Structural Dynamics
Deliver advanced fluid/structural computational codes.

Military Capacitors
Fabricate and test full-scale, high-energy-density capacitors.

Enhanced Payloads Options ($475K)

Thermal and Mechanical Phenomenology
Develop non-ideal airblast phenomenology to support USANCA warfighting issues and to assist STRATCOM in weapon use. Apply airblast phenomenology to enhance understanding of the consequence of a terrorist weapon detonation.

Weapon/Target Interaction ($8,432K)

Hard Target Response
Execute protective design, anti-penetration, and lethality tests against a hardened Command, Control, Communications and Intelligence (C3I) structure using Project AB testbeds. Investigate promising new concepts within existing programs.

Special Targets
Geotechnical characterization of tunnel target sites.
Small-scale experiments and rock-damage calculations of tunnel defeat mechanisms.

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Project AC - Weapons Systems Lethality (cont'd)
FY 1997 Plans

Nuclear Collateral Effects
Release HASCAL, version 3.0, including bio-kinetic models for human response, medium resolution local weather model, and refined source expulsion models.
Collateral Effects Source Terms

US/Allied Survivability and Operability in Nuclear/Designated Advanced Weapon Environments ($3,957K)

Weapon Effects
Develop a design module to resist advanced warhead concepts.
Validate predictive methods for advanced warheads MEA.
Incorporate advanced warheads into MEA.

Electro-Thermal Chemical Gun ($5,956K)

Weapon Effects
Gun testing of long-range projectile flight body.
Begin long-range gun development.
Work with Army/Navy to integrate Electro-Thermal Chemical technology into operational system.
Complete advanced Electro-Thermal Chemical indirect fire testing.
Begin full scale testing of ETC direct fire cartridges, M256 main tank gun.

Nuclear/Designated Advanced Weapons Effects ($7,895K)

Special Targets
Computer based target planning and characterization models.
Electromagnetic Lethality
Conduct static outdoor demonstration of electromagnetic effects on weapons systems; construct Breadboard and Brassboard pulse power.

Modeling and Simulation ($935K)

Begin addition of Weapons of Mass Destruction models to Virtual Interactive Target; provide expanded technical support to wargames.

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Project AE - Weapon Safety and Operational Support - This project directly supports the CINCs, Joint Chiefs of Staff, and Office of Secretary of Defense with assessments of nuclear weapon system safety, security, and employment. It also supports the traditional requirements for maintenance of a nuclear deterrent force, a safe and secure stockpile, and force survivability. The project objectives are to improve weapons safety, employment planning, command and control, force structure, force effectiveness and engineering support for vulnerability assessments. Included are nuclear stockpile fire resistance enhancement studies and weapon system safety assessments. In support of DNA's role as the DoD Executive Agent for sustaining nuclear weapons training expertise, this project provides for course development at the Defense Nuclear Weapons School (DNWS) to help sustain critical nuclear competencies and to address emerging national security priorities such as counterproliferation. It also provides for the establishment of an Agency modeling and simulation center capable of near-real-time, analytic support to CINC target planning and force structure analysis. One element of this modeling and simulation center is the development of virtual environments and target databases for wargaming and exercises. Further, the project will assess the relative value/cost effectiveness of system survivability concepts and provide a coherent acquisition/transition strategy from promising concepts to advanced development efforts.

FY 1995 Accomplishments

Nuclear Operations ($17,702K)

Nuclear Weapon System Safety Qualification

- Continued the Weapon System Safety Assessment of the B-52H Aircraft, for Air Force Chief of Safety.
- Continued the Fire Resistance Enhancement study of the enduring nuclear stockpile, for the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB)).
- Completed the Accident Resistant Container (ARC) study for ATSD(NCB).

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1995 Accomplishments

Conducted large-scale solid propellant sensitivity tests.
Conducted mock C-141 Fuselage Fuel Fire thermal characterization testing.
Conducted W78/MMIII impact crash/burn testing to investigate High Explosive reaction thresholds.
Provided support to Nuclear Weapons Council (NWC), ATSD(NCB), Air Force and Project Officers Group on nuclear safety matters.
Conducted tech-base efforts in the area of fuel fire and energetic materials.

Planning and Operations Support
Improved USSTRATCOM's strategic planning capability by integrating the planning tools and migrating to a client server architecture.
Provided capability for DNA-developed models to interactively feed data to mission planning systems.
Enhanced NATO's nuclear planning system and reduced adaptive nuclear planning cycle.
Added space surveillance technology to the Integrated Theater-Engagement Model (ITEM) and examined joint operations under potential WMD employment conditions.

Advanced Force Concepts/Analyses
Conducted technical analyses for OSD, CINCs, Services, Joint Staff and NWC on nuclear infrastructure, stockpile planning, force structure, storage issues, weapons safety and security, counterproliferation planning, and regional security and stability.

Force Integration Operational Analyses
Conducted technical analyses to support CINCs, Services, and Joint Staff on operational forces planning, theater missile defense, nuclear forces, counterproliferation, command and control, and regional security issues in light of the changing international security environment.

Advanced Survivability
Transitioned Laser Countermeasure to USAF; expanded application to USA/USN forces.
Transitioned Weapon Storage and Safety System (WS3) Regeneration to NATO and USAF.

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1995 Accomplishments

Initiated FY95-99 nuclear survivability systems integration program focused on regional conflict with WMD present.
Completed carrier battle group Defense Systems Prototype and proof-of-principle testing.

Weapons Effects Hazard Response
Developed and integrated next generation WMD hazard prediction codes into a suite of decision making tools.
Developed a casualty assessment module.
Consolidated efforts to produce a DoD operational hazard prediction capability.
Improved visualization of weapons effects for distributed interactive simulations.

Nuclear Weapons Employment Options
Supported improvements to nuclear weapons safety and survivability.
Provided and evaluated command and control infrastructure support, and force employment options under WMD threat.
Analyzed and provided recommended upgrades to Joint Chiefs of Staff (JCS), NATO and CINC employment planning systems.
Continued development of alternative strategies for U.S. strategic weapons employment.

System Assessment and Analytical Weapon Concepts
Develop effectiveness estimates for the current stockpile weapons using the Extended Air Defense Simulation (EADSIM) scenario(s) developed under High Power Radio Frequency (HPRF) Phase II for USSTRATCOM. Used these same scenarios to assess the probability of arrival for different types of platforms.
Continued HPRF Phase 2 feasibility joint study.
Continued wargame consequence analysis support.
Continued ADP upgrades, maintenance, and model integration/technical support.

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Project AE - Weapon Safety and Operational Support

FY 1995 Accomplishments

Education/Training to Maintain Core Competencies ($875K)

Nuclear Operational Expertise

Continued development of Counterproliferation Awareness Course; completed development of Joint DoD/DoE Nuclear Weapons Safety and Security Course; continued development of Automated Nuclear Weapons Training System; initiated nuclear operational training support to CINCs, OSD and Services.

Continued developing, improving, and integrating course materials for Defense Nuclear Weapons School.

Modeling and Simulation ($1,752K)

Modeling and Simulation Development

Developed the synthetic exercise environment for use in wargaming and training exercises.

Initiated and established center for development, integration and demonstration of WMD codes for use within the modeling and simulation environment for analytical support, wargaming, training, Distributed Interactive Simulation (DIS) and operational support.

Integrated weapons effects codes from Project AC within DIS architecture.

Certified weapon effects codes within DIS architecture.

Test and Simulation ($326K)

Support of RDT&E

Supported an RDT&E cell at Field Command, DNA, which provides support for Permanent High Explosive Test Site (PHETS), White Sands Missile Range (WSMR), New Mexico.

Nuclear Weapons Effects Phenomenology ($4,325K)

Systems Survivability and Vulnerability Analysis

Conducted survivability assessments as requested by CINCs and NATO Allies to improve survivability and to support programmatic and investment decisions for hardened facilities.

Provided technical support to other government agencies conducting vulnerability assessments of foreign hardened facilities.

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Project AE - Weapon Safety and Operational Support (cont'd)

FY 1995 Accomplishments

Developed techniques to assess the survivability of U.S. and allied underground facilities against new generation non-nuclear, non-conventional weapons.

FY 1996 Plans

Nuclear Operations ($17,701K)

Stockpile Stewardship and Reliability

- Initiate DNA participation in, and support to, the Dual Revalidation program.
- Conduct research and review and analyze technical assessments and reports.
- Provide progress reports to ATSD(NCB).
- Provide technical support and recommendations to ATSD(NCB), Joint Staff, Services, STRATCOM, and other Combatant Commanders as required.
- Initiate DNA support to the Annual Certification program.
- Assist ATSD(NCB) to develop the process and report format.
- Review and provide input to the Annual Certification report.
- Provide assistance to ATSD(NCB) in the area of Stockpile Stewardship.
- Review, analyze and make recommendations to ATSD(NCB) on the DoE Stockpile Stewardship and Management Plan and Science Based Stockpile Stewardship program.

Nuclear Weapon System Safety Qualification

- Continue the Weapon System Safety Assessment of the B-52H Aircraft.
- Complete the Fire Resistance Enhancement study of the enduring nuclear stockpile.
- Continue the safety assessment of solid propellant sensitivity tests.
- Continue to provide safety assessment support to the Nuclear Weapons Council (NWC), ATSD(NCB), USSTRATCOM, Services, and Project Officers Group.
- Continue tech-base efforts in the area of fuel fire and energetic materials.
- Initiate tech-base effort in the area of electrical/lightning effects.

Planning and Operations Support

- Continue to update USSTRATCOM's automated strategic planning capability including tanker, B-52, and Conventional Air-Launched Cruise Missile (CALCM) planning.

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1996 Plans

Provide capability for interactive data transfer between non-Agency and Agency developed mission planning codes and DNA-developed models to facilitate adaptive planning (Common Operational Modeling, Planning and Simulation Strategy (COMPASS)).

Transition Integrated Theater Engagement Model (ITEM) to the Navy.

Advanced Force Concepts/Analyses

Continue to conduct technical analyses as requested for OSD, CINCs, Services, Joint Staff and NWC on nuclear infrastructure, stockpile planning, force structure, storage issues, weapons safety and security, counterproliferation planning, and national and global security issues.

Force Integration Operational Analyses

Continue to conduct technical analyses to support CINCs, Services and Joint Staff on operational force planning, theater missile defense, nuclear forces, counterproliferation, command and control, and regional security issues in light of the changing international security environment.

Advanced Survivability

Continue survivable system integration program assessment for WMD scenarios.

Conduct suitability analyses and proof-of-principle testing of laser counter measures for USA/USN forces.

Transition carrier battle group defense system to USN.

Initiate Global Positioning System (GPS) Denial Technology Review.

Develop Survivability Improvement Investment Strategy.

Weapons Effects Hazard Response

Develop and downsize WMD hazard prediction codes.

Implement operation of the casualty assessment module.

Transition existing WMD assessment tools to Services.

Nuclear Weapons Employment Options

Support improvements to nuclear weapons safety and survivability, command and control, and employment planning improvements.

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1996 Plans

Continue development of alternative strategies for U.S. strategic weapons employment.

System Assessment and Analytical Weapon Concept

Continue to develop effectiveness estimates for current stockpile weapons using extended air defense simulation (EADSIM) scenarios developed under the high power radio frequency (HPRF) phase II study for USSTRATCOM.

Complete HPRF phase 2 feasibility study; continue with recommended follow-on analysis as required by USSTRATCOM.

Continue to provide technical/operational consequence analysis support for exercises and wargames and database development.

Continue model integration/technical support.

Complete development of DNA analytic center; continue to provide quick turn analysis for OSD, Services, and Joint Staff on WMD consequence analysis and counterproliferation planning.

Provide assistance to B61 POG on mission analysis and effectiveness of proposed B61-MOD 11.

Education/Training to Maintain Core Competencies ($1,161K)

Nuclear Operational Expertise

Complete development of Counterproliferation Awareness Course; continue development of Automated Nuclear Weapons Training System; continue nuclear operational training support to CINCs, OSD and Services; begin development of DoD nuclear safety training program.

Continue development, improvement, and integration of course materials for Defense Nuclear Weapons School.

Modeling and Simulation ($2,442K)

Modeling and Simulation Development

Mature and test the synthetic exercise environment for use in wargaming and exercises.

Continue Modeling and Simulation Center efforts at DNA.

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Project AE - Weapon Safety and Operational Support (Cont'd)

FY 1996 Plans

Transition DNA codes appropriate for use within DIS to Modeling and Simulation Center.

Test and Simulation ($399K)

Support of RDT&E

Support an RDT&E cell at Field Command, DNA, which provides support for PHETS, WSMR, NM.

Nuclear Weapons Effects Phenomenology ($4,218K)

Systems Survivability and Vulnerability Analysis

Conduct survivability assessments as tasked by CINCs to improve facility survivability and to support investment decisions for facility upgrades.

Provide vulnerability assessments of foreign underground facilities to support the CINCs.

Identify critical nodes in the National Defense Infrastructure System.

FY 1997 Plans

Nuclear Operations ($19,836K)

Nuclear Weapon System Safety Qualification

Complete the safety assessment of solid propellant fuels (Air Force, Minutemen III).

Complete the Weapon System Safety Assessment of the B-52H aircraft.

Continue tech-base efforts in the areas of fuel fire and energetic materials.

Continue tech-base efforts in the area of electrical/lightning effects

Initiate a Weapon System Safety Assessment (WSSA) for a third major weapons system.

Initiate a WSSA of the risks associated with the long-term storage of nuclear munitions for the DoD stockpile.

Continue to provide safety assessment support to the NWC, ATSD(NCB), USSTRATCOM, Services, and Project Officer's Group.

Planning and Operations Support

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1997 Plans

Initiate an adaptive planning system software program to develop a deployable strategic planning capability for USSTRATCOM.
Complete the development of a hardware/software interface between NATO Nuclear Planning Systems (NNPS) and US/NATO intelligence systems.
Develop a prototype computer-based training capability for nuclear staff planners, emphasizing adaptive nuclear planning using NNPS parameters.

Advanced Force Concepts/Analyses
Continue to conduct technical analyses as required for OSD, CINCs, Services, Joint Staff, and NWC on nuclear infrastructure, stockpile planning, force structure, storage issues, weapons safety and security, counterproliferation, planning, and international military and political security issues.

Force Integration and Operational Analyses
Continue to conduct technical analyses to support CINCs, Services and Joint Staff on operational force planning, theater missile defense, counterproliferation, nuclear forces, command and control, and regional security issues in light of the changing international security environment.

Advanced Survivability
Continue GPS Denial Technology Review.
Initiate survivability integration demonstration program as follow-on.

Weapons Effects Hazard Response
Refine and upgrade WMD hazard assessment codes.
Deliver Full Operational Capability (FOC) WMD assessment tools to Services.

Nuclear Weapons Employment Options
Support improvements to nuclear weapons safety and survivability, command and control, and employment planning.
Continue development of alternative strategies for possible U.S. strategic weapons employment options in a WMD environment.

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1997 Plans

System Assessment and Analytical Weapons Concepts

- Continue to conduct extended air defense simulation (EADSIM) based scenarios for additional studies to support USSTRATCOM requests.
- Continue to provide technical/operational consequence analysis support for exercises and wargames; initiate development of a dial-in capability to provide real-time support to services.
- Continue model integration/technical support; update and refine support database per CINCs, Services and Joint Staff guidance.
- Continue development of consequence analysis in support of WMD counterproliferation programs.
- Continue to provide quick turn around analysis on WMD consequence issues for OSD, Services and Joint Staff.
- Continue to provide weapons effects analysis to weapons Project Officers Groups and weapons modification programs as requested.

Education/Training to Maintain Core Competencies ($975K)

Nuclear Operational Expertise

- Continue development of Automated Nuclear Weapons Training System; continue nuclear operational training support to CINCs, Services, and OSD; continue development of DoD nuclear safety training program.
- Continue development, improvement, and integration of course materials for Defense Nuclear Weapons School.

Modeling and Simulation ($2,080K)

Modeling and Simulation Development

- Upgrade and refine operations of Modeling and Simulation Center.
- Provide an integrated program for analysis and testing of alternate strategies, force employment options and technologies.

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Project AE - Weapon Safety and Operational Support (Cont'd)
FY 1997 Plans
Test and Simulation ($383K)
Support of RDT&E
Support an RDT&E cell at Field Command, DNA, which provides support for PHETS, WSMR, NM.
Nuclear Weapons Effects Phenomenology ($4,168K)
Systems Survivability and Vulnerability Analysis
Conduct survivability assessments as tasked by CINCs to improve facility survivability and to support investment decisions for facility upgrades.
Provide vulnerability assessments of foreign underground facilities to support the CINCs.
Conduct Integrated Infrastructure Assessments of the national defense infrastructure.

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Project AF - Weapon System Operability - This project provides the technology base and support to ensure that current and future DoD systems such as Command, Control, Communications, Computers and Intelligence (C4I) systems, aircraft and missile defensive systems, and personnel can survive and operate effectively through the spectrum of conventional and nuclear weapon-disturbed environments. Planned efforts emphasize development of technology to preserve the functional survivability to combined hostile effects from low intensity nuclear conflict. The project supports DoD acquisition policy by utilizing commercial, multi-use technology whenever possible. It develops and demonstrates affordable hardening and mitigation technologies that can be transferred to industry, the Services, and system acquisition programs. The principal products from this project include direct support to the warfighters to quantify the impact of nuclear, chemical and biological (NBC) and conventional battlefield environments on systems and personnel; development and demonstration of radiation-hardened microelectronics for space systems; cost effective certification techniques for testable hardware that does not require underground nuclear tests; tools for measuring soldier effectiveness in NBC battlefields; training and system acquisition tools to support performance and cost analysis for military systems.

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Project AF - Weapon Systems Operability (cont'd)
FY 1995 Accomplishments
Test & Simulation ($1,861K)
  Aboveground Test/Underground Test (AGT/UGT) Correlation
    Completed correlation of AGT/UGT data analysis tools to assist testable hardware protocol development.
    Published design guidelines for OT hardware and software for data and signal processing.
Nuclear Weapons Effects Phenomenology ($6,139K)
  Survivable Sensors
    Completed initial assessment of operability of Space-Based Infrared System (SBIRS) satellites in nuclear environments.
  Testable Hardware Technology
    Developed spacecraft design and test protocol to validate radiation hardness.
    Evaluated testing to verify testable hardware protocol development.
    Developed sensor design and test protocols to validate radiation hardness.
    Modified sensor hardware/software to analyze focal plane arrays.
  Distant Light Wrap-up
    Completed program; published final report.
  System Effects
    Completed program; published final report.
US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($8,547K)
  Human Response Phenomenology
    Completed the safety testing of the radiation anti-emetic drugs for NATO.
  Nuclear Survivable Program Management Support
    Completed hardening cost models for ships.
Radiation-Resistant/Hardened Microelectronics, Materials, and Electro-optics ($11,753K)
  Radiation Hardened Microelectronic Technology Demonstration

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Project AF - Weapon Systems Operability (cont'd)
FY 1995 Accomplishments

Demonstrated prototype radiation resistant 1-megabit Static Random Access Memory (SRAM) Testable Hardware Technology.
Delivered Application-Specific Integrated Circuits (ASICs) design for OT capability.

Radiation-Hardened Microelectronic Enabling Technology
Completed radiation hardness cryogenic microelectronic reliability and radiation technology assessment.

Function Through
Completed program; published final report.

EM Hardening of Electronics and Electro-optics ($5,307K)

Electromagnetic Pulse (EMP)
Tested critical C4I facilities.
Published Hardness Maintenance/Hardness Surveillance (HM/HS) guidelines and cost data.

Combined Battlefield Environmental Effects (CBEE)
Initiated CBEE Phase 1 and developed enhanced JANUS model.

Enabling Technology - High Density Integration (HDI) and Sensors
Initiated package protocol for highly pipelined architectures.

Nuclear/Advanced Weapons Effects ($5,797K)

Testable Hardware Technology
Developed sensor design and test performance requirements.
Developed interceptor and surveillance test protocols for hardness assurance testing.

Enabling Technology - HDI and Sensors
Delivered low-noise measurement capabilities for advanced HDI packages.

Technology Transfer ($413K)

Committee on Interagency Radiation Research and Policy Coordination (CIRRPC)
Completed draft report on U.S. radon levels; produced quarterly and annual reports.

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Project AF - Weapon Systems Operability (cont'd)
FY 1995 Accomplishments (cont'd)
Modeling & Simulation ($5,840K)
  Human Response Phenomenology
    Continued radiation anti-emetic drug trials.
  Reliable Communications
    Supported Space Command (SPACECOM) Tactical Warning/Attack Assessment (TW/AA) connectivity operability assessment.
    Completed Phase I "STRATCAT" (Strategic C4I Assessment Tool) for STRATCOM for Joint Warrior Interoperability Demonstrations (JWID)-95.
  Atmospheric Effects Applications
    Developed preliminary space modeling plan; began model implementation.

FY 1996 Plans
Test & Simulation ($1,077K)
  AGT/UGT Correlation
    Demonstrate toolkits and system analysis capabilities to evaluate current simulators.
    Deliver electronic database system analysis to users.
    Provide upset/burnout testing analysis of advanced technologies.
    Complete collecting and coordinating all optical UGT data for extrapolation to future materials.
  Testable Hardware Technology
    Develop Hardware-in-the-Loop (HWIL) Testbed to demonstrate sensor response in nuclear environment.
Nuclear Weapons Effects Phenomenology ($5,833K)
  Radiation Phenomenology
    Incorporate ground-based radar model for Theater Missile Defense (TMD) Program.
    Support cost performance tradeoff for sensor operability issues for SBIRS in nuclear environments.
    Continue assessment of SBIRS sensor operability for Geodynamic Experimental Ocean satellites.

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Project AF - Weapon Systems Operability (cont'd)
FY 1996 Plans (cont'd)
US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($5,574K)
- Human Response Phenomenology
  - Complete radiation anti-emetic drug recommendation for NATO.
- Testable Hardware Technology
  - Develop spacecraft, missile/interceptor, and sensor demonstration test objects to assist protocol and operability assessments in a nuclear environment
- Materials and Optics
  - Deliver lightweight mirror analysis.
  - Complete optical materials test coupon design and initial protocol development.
- Nuclear Survivable Program Management Support
  - Produce draft integrated guidelines for program manager survivability plan development for missiles.
  - Produce draft MIL-STD on Hardness Assurance, Maintenance, & Surveillance (HAMS).

Radiation-Resistant/Hardened Microelectronics, Materials, and Electro-optics ($13,029K)
- Radiation Hardened Microelectronic Technology Demonstration
  - Demonstrate 4-megabit SRAM technology.
  - Test and evaluate prototype radiation resistant 1-megabit SRAM.
- Testable Hardware Technology
  - Provide component level (i.e. Analog Signal Processing (ASP), Digital Signal Processing (DSP), and Focal Plane Assembly (FPA)) testing.
- Radiation Hardened Microelectronic Enabling Technology
  - Complete combined Qualified Manufacturers List (QML) radiation hardness assurance procedures.
  - Finish Jam-Resistant Secure Communications (JRSC) satellite terminal tests.
  - Defense Support Program (DSP) upgrade for MIL-STD 2169B.

EM Hardening of Electronics and Optics ($5,493K)
- Electromagnetic Pulse

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Project AF - Weapon Systems Operability (cont'd)

Begin program to advance state-of-the-art in EMP/High Power Microwave (HPM) hardening technology.

Nuclear/Designated Advanced Weapons Effects ($4,513K)

Testable Hardware Technology

Develop a test protocol for sensors and optical materials.

Develop design and test protocols for missiles/interceptors and spacecraft.

Modeling & Simulation ($7,848K)

Human Response Phenomenology

Develop Consolidated Radiation Environments Software-1 (CORES-1) which models nuclear weapons environments.

Radiation Phenomenology

Complete TW/AA connectivity operability assessment for SPACECOM.

Complete clutter model for Over-the-Horizon Radar for Southern Command (SOUTHCOM) drug interdiction program.

Deliver Phase 2 "STRATCAT" to STRATCOM.

Complete space modeling design.

Conduct initial interactive operation of all modules.

FY 1997 Plans

Test & Simulation ($1,385K)

Testable Hardware Technology

Begin testing of spacecraft, missile, and sensor demonstration test objects for validation of design and test protocols.

AGT/UGT Correlation

Provide correlations to "evaluate to protocols" for commercial and unhardened military systems.

Provide completed configuration control electronics database for qualification testing.

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Project AF - Weapon Systems Operability (cont'd)
FY 1997 Plans (cont'd)
Nuclear Weapons Effects Phenomenology ($6,662K)
  Survivable Sensors
    Complete assessment of SBIRS sensor operability for Geodynamic Experimental Ocean satellites.
US/Allied Survivability & Operability in Nuclear/Designated Advanced Weapon Environments ($6,863K)
  Human Response Phenomenology
    Initiate integration of human response models into Distributed Interactive Simulations (DIS).
  Testable Hardware Technology
    Upgrade testable hardware protocols based on validation testing results.
    Initiate AGT hardness demonstration tests of optical materials used in sensor subsystems.
    Demonstrate software solutions to minimize radiation effects on system operability.
  Materials and Optics for Testable Hardware
    Demonstrate draft protocols for optical materials scaling to new material and old UGT data.
    Initiate development of smart optics test protocols for combined effects testing.
  Nuclear Survivable Program Management Support
    Publish a manual for nuclear survivability of missile systems.
Radiation-Resistant/Hardened Microelectronics, Materials, and Electro-optics ($13,796K)
  Radiation Hardened Microelectronic Technology Demonstration
    Test and evaluate radiation tolerant analog & digital microelectronics.
    Demonstrate 16-megabit SRAM Technology.
    Demonstrate production-worthy, radiation-resistant 1-megabit SRAM.
  Testable Hardware Technology
    Validate testable hardware protocols using HWIL simulators on distributed systems with shared memories and processors.

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Project AF - Weapon Systems Operability (cont'd)
FY 1997 Plans (cont'd)
  Radiation Hardened Microelectronic Enabling Technology
    Demonstrate radiation tolerant Giga Scale Integrated Circuit (GSIC) technology.
EM Hardening of Electronics and Optics ($3,729K)
  Electromagnetic Pulse
    Continue testing of critical fixed-ground-based C4I facilities.
  Balanced Electromagnetic Hardening Technology
    Assess/implement innovative, low-cost EMP/HPM hardening technology concepts.
Nuclear/Designated Advanced Weapons Effects ($3,080K)
  Testable Hardware Technology
    Begin sensors technology demonstration testing.
Modeling & Simulation ($6,346K)
  Radiation Phenomenology
    Deliver final version of "STRATCAT" C4I assessment tool to STRATCOM.
    Support communications operability assessment for SBIRS.
    Complete longwave noise program for fleet submarine broadcasting system.
    Develop initial space environmental prediction forecast model.

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Project AG - Scientific Computations & Information Systems - This project provides High Performance Computing (HPC) computational databases and advanced numerical models that enable DNA's customers, researchers, and RDT&E contractors to answer questions on all aspects of nuclear and advanced special weapons effects. Calculations, models and codes are developed and used to aid the design of experiments, predict types and levels of measurements required, establish system design requirements, assess performance, and provide system-specific predictions of weapons effects to DoD planners. The principal thrusts respond to warfighter requirements for survivable systems and effective weapons. Applications involve packaging nuclear data and physical understanding into advanced computational products that enable fundamentally new capabilities for warfighter interaction and visualization. This project also supports the development and population of the Data Archival and Retrieval Enhancement (DARE) info system, a hierarchival database tailored to the specific needs of the researcher, the system designer/developer, and the warfighter. Also, aspects of nuclear matters require utilization of advanced computational resources e.g., for investigation of the physics in weapon-target interactions, and for extrapolating from test results when new tests are not possible. This project also develops user-friendly interactive databases, technical archives, and design aids for system developers.

FY 1995 Accomplishments

Test & Simulation ($411K)
- Computer Operations Support
  - Provided centralized CRAY resources.

Nuclear Weapons Effects Phenomenology ($1,862K)
- Computer Operations Support
  - Provided centralized CRAY resources.
- DATACOM Computational Support
  - Provided wide area connections.

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Project AG - Scientific Computations & Information Systems

FY 1995 Accomplishments

Nuclear Operations ($5,852K)

Science and Technology Information Analysis Center (IAC)

Provided broad-based research support.

DATACOM Computational Support

Provided annual support for Wide Area Network connection with T-1 Backbone and High Speed Links.

Continued to provide ongoing technical assistance and network management.

Conducted annual assessment of circuit utilization, price/performance, and requirements; initiated changes and acquisitions.

Technical Information Products

Began next generation weapon effects Computational Aids. Updated the standard reference Effects Manual-1.

Disseminated six nuclear weapon effects Computational Aids.

Identified new requirements and assisted users in understanding weapon effects data and calculations.

Began distributing DNA's Science and Technology Digest within DoD to address survivability issues.

Applications for Nuclear Weapons Expertise ($5,063K)

Computer Operations Support

Continued to provide centralized CRAY resources.

Provided continuous technical assistance for users of CRAY and other HPC platforms.

Conducted annual assessment of HPC support requirements; initiated follow-up agreements and activities.

Data Archival and Retrieval Enhancement (DARE) ($1,197K)

Reached Initial Operational Capability for DNA's DARE.

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Project AG - Scientific Computations & Information Systems

FY 1995 Accomplishments

Nuclear Weapons Technical Assistance Publications ($477K)
- Science and Technical Publishing

Modeling and Simulation ($2,122K)
- Advanced Computational Methods
  - Validated turbulent dusty-flow model capability available for transfer.
  - Defined magneto-hydrodynamics (MHD) test problem for predicting atmospheric effects.

FY 1996 Plans

Test & Simulation ($324K)
- Computer Operations Support
  - Continue to provide centralized CRAY resources.
- DATACOM Computational Support
  - Continue to provide wide area connections.

Nuclear Weapons Effects Phenomenology ($1,651K)
- Computer Operations Support
  - Continue to provide centralized CRAY resources.
- DATACOM Computational Support
  - Continue to provide wide area connections.

Nuclear Operations ($5,642K)
- DATACOM Computational Support
  - Provide annual support for Wide Area Network connection with additional High Speed Links.
  - Continue providing ongoing technical assistance and network management.
  - Conduct annual assessment of circuit utilization, price/performance, requirements; initiate changes and acquisitions.
- Science and Technology IAC
  - Provide broad based research support.

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Project AG - Scientific Computations & Information Systems

FY 1996 Plans

Technical Information Products

Disseminate three nuclear weapon effects Computational Aids.

Initiate computational adjuncts employing diverse visual displays that are scenario-driven and exchange data and results with other warfighter displays.

Disseminate Science and Technology Digest

Finalize Effects Manual-1 Technical Handbook. Disseminate NATO version of Effects Manual-1.

Applications of Nuclear Weapons Expertise ($4,720K)

Computer Operations Support

Continue to provide centralized CRAY resources.

Provide continuous technical assistance for users of CRAY and other High Performance Computing (HPC) platforms.

Provide interactive visualization and animation of complex computer results for remote users.

DATACOM Computational Support

Provide wide area connections.

Data Archival and Retrieval Enhancement (DARE) ($2,605K)

Upgrade DNA's Data Archival and Retrieval Enhancement for test data.

Load High Priority Legacy Test Data.

Nuclear Weapons Technical Assistance Publications ($570K)

Science and Technical Publishing

Modeling and Simulation ($2,929K)

Computer Operations Support

Provide centralized CRAY resources.

DATACOM Computational Support

Provide wide area connections, specifically to Defense Research and Engineering Network (DREN) and research collaborators.

Advanced Computational Methods

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Project AG - Scientific Computations & Information Systems

FY 1996 Plans

Demonstrate anelastic version of Godunov code for application to weather/dust transport.

Demonstrate non-premixed turbulent combustion version of the Godunov code; demonstrate on bomb-in-structure problem.

FY 1997 Plans

Test & Simulation ($209K)

Computer Operations Support

Provide centralized CRAY resources.

DATACOM Computational Support

Provide wide area connections.

Nuclear Weapons Effects Phenomenology ($2,489K)

Computer Operations Support

Provide centralized CRAY resources.

DATACOM Computational Support

Provide wide area connections.

Nuclear Operations ($7,170K)

DATACOM Computational Support

Provide annual support for Wide Area Network connection with additional T-1 Backbone and High Speed Links.

Continue providing ongoing technical assistance and network management.

Conduct annual assessment of circuit utilization, price/performance, & requirements; initiate changes and acquisitions.

Begin implementation of HQDNA hubsite for DoD HPC DREN interconnections.

Science and Technology IAC

Provide broad based research support.

Technical Information Products

Conclude development of nuclear weapons effects Computational Aids.

Disseminate Science & Technology Digest.

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Project AG - Scientific Computations & Information SysKtems
FY 1997 Plans
Continue development and testing of computational adjuncts employing diverse visual displays that are scenario-driven and exchange data and results with other warfighter displays.
Disseminate update of The Effects of Nuclear Weapons.
Disseminate Computational Aids for total characterization of nuclear weapons effects.
Disseminate Effects Manual-1 Technical Handbook.
Applications of Nuclear Weapons Expertise ($2,434K)
Computer Operations Support
Continue to provide centralized CRAY resources.
Provide continuous technical assistance for users of CRAY and other HPC platforms.
Provide high performance networks to supply display of supercomputer results.
DATACOM Computational Support
Provide wide area connections.
Data Archival and Retrieval Enhancement (DARE) ($2,472K)
Expand archival of airblast, thermal, and other nuclear test data, reports, and photography for retrieval in DNA's DARE.
Nuclear Weapons Technical Assistance Publications ($575K)
Science and Technical Publishing
Modeling and Simulation ($2,829K)
Advanced Computational Methods
Begin code work on explicit radiation modeling.
Begin initial combustion/afterburning modeling for incendiary devices.
Complete explosion dynamics modeling for direct-fire Electro-Thermal Chemical (ETC) cartridge.
Provide centralized CRAY resources.
DATACOM computational Support
Provide wide area connections.

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Project AH - Counterproliferation Technical Support - This project responds to the essential technology base development called for in the DoD Counterproliferation Initiative. The Deputy Secretary of Defense report entitled "Report on Nonproliferation and Counterproliferation Activities and Programs" of May 1994, as complemented by the DoD Counterproliferation Acquisition Strategy, outlines critical technology areas to address counterproliferation shortfalls. Specifically, the report calls for technology base efforts to identify, characterize, and defeat hard underground facilities. This project represents the foundation to address those issues for all classes of Weapons of Mass Destruction (WMD). There are three principal components: (1) target site characterization (jointly conducted with the intelligence community); (2) functional vulnerability assessment; and (3) WMD life cycle analysis and target planning support. The site characterization program supports the intelligence community's efforts to fully describe hardened WMD target sites. Included are efforts to assess facility signatures to aid sensor (e.g., Unattended Ground Sensors) development and geologic characterization to guide weapon development initiatives. The functional vulnerability program will identify alternative means to disable or disrupt deeply buried facilities for which physical destruction is not practical. This effort will identify critical internal/external vulnerabilities of WMD target sites and evaluate alternate kill mechanisms or operational concepts to optimize functional disruption of these WMD targets. The site characterization, and physical/functional vulnerability programs will develop lethality criteria to hold such targets at risk. The WMD life cycle analysis and target planning program will develop a target planning tool providing the National Command Authority and Warfighting CINCs the means to optimize weapon and aimpoint selection to meet targeting objectives while minimizing collateral effects. Key elements of the capability are developed by this project and include: (1) WMD life cycle analysis to identify key vulnerability nodes along the Nuclear, Biological, and Chemical (NBC) proliferation path; (2) detailed target characterization as discussed above; (3) agent neutralization research to determine NBC material vulnerability and associated damage mechanisms and (4) collateral effects research to develop algorithms to predict the implications (e.g., hazardous material dispersal) of attacks on NBC facilities and other target classes

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Project AH - Counterproliferation Technical Support (cont'd)
(e.g., aboveground WMD infrastructure) will be included in the collateral effects and battle damage assessment considerations. Technical feasibility studies will be conducted on emerging technologies to ensure critical counterproliferation shortfalls are resolved. The Counterproliferation Advanced Concept Technology Demonstration is supported, in part, by this project. Beginning in FY 1996, funding has been transferred from DNA to the centrally-managed OSD Counterproliferation program element.

FY 1995 Accomplishments
Counterproliferation Technology Support ($3,379K)
- Initiated planning/enhanced payload/collateral effects technology demonstration.
- Completed chemical weapons proliferation analysis.
- Initiated underground facility signature assessment.

Expulsion Experimentation ($245K)
- Completed 1/6- & 1/3-scale expulsion tests.
- Initiated 1/2-scale expulsion tests.

Agent Neutralization ($1,521K)
- Published thermal and ionizing radiation neutralization criteria for spores.
- Started hazard mitigation studies.

Enhanced Payloads ($870K)
- Gathered data from large scale High Temperature Accelerant phenomenology testing.
- Conducted containment diffusion experiments.

Underground Structures ($1,862K)
- Executed ten tests in adits in medium strength, sedimentary media.

FY 1996 Plans
Funding was transferred from DNA to the centrally-managed OSD Counterproliferation program element.

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Project AI - Hard Target Tunnel Defeat & NTS Sustainment - The Presidential Decision Directive (PDD) on Stockpile Stewardship implemented an indefinite moratorium on underground nuclear testing while requiring retention of the capability to resume testing at Presidential direction. DNA has complied with this policy by realigning the previously existing underground test program to emphasize non-nuclear simulator technology and facility development and production, and to establish a program for an orderly decommissioning and mothballing of the national underground test assets. The following major tasks will satisfy this requirement: (1) continue test complex shutdown, including tunnel stabilization and preservation; (2) continue environmental characterization; (3) document testbed design and construction methodology. This effort incorporates those activities and costs from Project AA, Underground Test (terminated in FY94), which are appropriate to preserving the national underground nuclear test capability.

The United States and its allies face a growing threat related to critical military targets hidden within and shielded by tunnel complexes. Battle management/command, control, and communications facilities, Theater Ballistic Missiles and their Transporter-Erector-Launchers (TELs), and biological/chemical/nuclear weapons production or storage facilities can be housed in tunnels. An objective of this program is to examine the ability of existing U.S. and Allied capabilities to hold tunnel targets at risk, resulting in a current performance baseline. Any deficiencies will be identified and the ability of planned systems to address these deficiencies will be assessed. Finally, new technologies needed to mitigate remaining shortfalls will be described and an acquisition strategy formulated. An integrated analysis and test program is necessary to address the complexities associated with this target set including geology, layout, protective measures, varying intelligence, and functional kill across missions and the impact of these variables on surveillance and strike capabilities.

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Project AI - Hard Target Tunnel Defeat & NTS Sustainment (cont'd)
FY 1995 Accomplishments
Nevada Test Site Activities ($5,090K)
- Test Bed Documentation
  - Continued documentation of current knowledge of techniques, procedures, and methodologies of underground nuclear radiation testing of military systems.
  - Continued transfer of appropriate Underground Test (UGT) technologies to other government programs.
- Test Site Infrastructure Maintenance
  - Maintained DNA activities at NTS in support of mothballing, decommissioning and environmental characterization activities.
- Tunnel Decommissioning and Support to Site Characterization
  - Completed decommissioning the first two tunnel complexes.
  - Began decommissioning of additional tunnel complex.
  - Completed disposal of excess equipment at NTS.
  - Maintained one tunnel complex and equipment in support of the stockpile stewardship program.
- Target Characterization
  - Collected construction and damage signatures.
- Functional Damage
  - Performed tunnel portal tests (static emplacement, NTS geology).
- Tunnel Construction/Test Support
  - Designed, planned, and began construction of tunnel target complex to provide target for hard target vulnerability tests.
  - Began construction of Tunnel Target Test Facility (TTTF).
  - Began TTTF Test/Exercise Planning.

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Project AI - Hard Target Tunnel Defeat & NTS Sustainment (cont'd)

FY 1996 Plans

Nevada Test Site Activities ($6,332K)

- Test Bed Documentation
  - Complete documentation and archival of underground testing techniques, procedures, and methodologies as budgeted.
  - Complete transfer of appropriate UGT technologies to other government programs.
- Test Site Infrastructure Maintenance
  - Maintain DNA activities at NTS in support of environmental characterization activities.
  - Continue to maintain NTS equipment and facilities.
- Tunnel Decommissioning and Site Characterization
  - Complete decommissioning of last tunnel complex to be closed.
  - Maintain one tunnel complex in support of the stockpile stewardship program.

Hard Target Tunnel Defeat ($2,000K)

- Target Characterization
  - Complete data survey.
  - Complete geologic characterization of Korean Multiple Rocket Launcher (MRL) sites.
- Phenomenology/Validation Tests
  - Perform Tunnel Portal Tests (static emplacement, Norway geology).
  - Complete Lethality Analysis of Buried Structures 1.1, probabilistic PC code for predicting buried structure damage under nuclear ground shock loading.
  - Conduct tests on concrete-lined tunnels in NTS geology.
- Tunnel Construction/Test Support
  - Complete Phase I construction and rehab of TTTF.
  - Begin test sequence for hard target kill and functional vulnerability of hard tunnel facilities.
  - Support Special Operation Forces (SOF) training exercise.

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Project AI - Hard Target Tunnel Defeat & NTS Sustainment (cont'd)
FY 1997 Plans
Nevada Test Site Activities($3,001K)
- Test Site Infrastructure Maintenance
  - Continue to maintain DNA activities at NTS in support of environmental remediation activities.
  - Continue to maintain NTS equipment and facilities.
- Tunnel Decommissioning and Site Characterization
  - Provide on-site DNA personnel to plan and supervise environmental remediation of DNA facilities using Defense Environmental Restoration Account (DERA) funds.
  - Maintain one tunnel complex in support of the stockpile stewardship program.

Hard Target Tunnel Defeat ($2,800K)
- Target Characterization
  - Collect construction, operational and damage signatures.
  - Establish virtual test capability to add operational realism.
- Reconstitution Modeling
  - Begin development of reconstitution model for portals and tunnel.
- Phenomenology/Validation Tests
  - Complete lab-scale penetration tests on intact rock.
  - Perform phenomenology test on tunnel deformation in jointed rock (2 of 3).
  - Complete lab-scale Portal damage tests on intact rock.
  - Complete tests on unlined and lined tunnels in TTTF limestone.
  - Enhance current Munition Effectiveness Assessment (MEA) by adding module for portal and tunnel damage (based on tunnel portal test data).
  - Conduct live drop on U16 tunnel portal.

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Project AI - Hard Target Tunnel Defeat & NTS Sustainment (cont'd)
FY 1997 Plans
Tunnel Construction/Test Support
Support exercises for functional kill of C3I facilities.
Perform tests investigating functional kill of C3I facilities.
Continue test sequence for hard target kill and functional vulnerability of hard tunnel facilities.
Complete rehab of TTTF.
Construct additional adits at TTTF for additional destructive testing.
Construct portal structure at U16 tunnel.

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Project AM - Counterterrorist Explosives Research - Terrorism has been an international problem for many years, but recent events have greatly increased the awareness of the domestic vulnerabilities to terrorism. The World Trade Center and Oklahoma City bombings have vividly illustrated the immediacy of the threat and the necessity that the U.S. be better prepared to respond. The extensive data base and expertise on nuclear and conventional weapons effects acquired over the last fifty years by the Defense Nuclear Agency (DNA) constitute a unique foundation for predicting the explosive and forensic environments to blast effects. The creation of this project reflects the Congressional intent to adapt and make available DNA technology and expertise to U.S. law enforcement authorities.

FY 1995 Accomplishments
None

FY 1996 Plans
Threat analysis and vulnerability baseline ($400K)
- Assess the range of threats (explosives configuration and constituents) likely to be encountered in the U.S.
- Summarize assessment in a data base which includes the characterization and classification of the vulnerabilities of major civilian and government resources.

Predictive modeling assessment, adaptation, and validation ($2,800K)
- Catalog and evaluate existing modeling capabilities (U.S. military and foreign).
- Adapt/apply selected models to representative test cases.
- Conduct selected sub-scale and full-scale tests to validate model performance.

Identify promising techniques for mitigating and remediating effects of terrorist use of high explosives and supporting law enforcement effectiveness. ($800K)
- Identify technology developments which have potential for improving tagging effectiveness.
- Assess effectiveness and impact (environmental, cost, disruption of civilian routine) of current remediation techniques and identify technology initiatives to enhance their effectiveness.

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Project AM - Counterterrorist Explosives Research (cont'd)

Review and assess explosive tagging methods and their effectiveness for evidentiary use in judicial actions and determine traceability to the manufacturers and users.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AN - Thermionics - Meeting national objectives in both the military and civilian areas will require large capacity (100kW) nuclear space power systems having long lifetimes. Specific requirements have been identified by the Air Force and NASA. The Air Force "New World Vistas" study, dated 15 December 1995, cites specific requirements for space nuclear power to accomplish force projection from space. NASA has identified requirements for power and propulsion for contemplated deep space missions and manned exploration. This project addresses the potential for thermionic energy conversion to meet these requirements by developing the capability of U.S. manufacturers to produce new and advanced thermionic converters, components, and systems. This effort will be coordinated with activities in Project AX which are focused on transferring Russian thermionic technologies to the U.S. industry.

FY 1995 Accomplishments
None

FY 1996 Plans
Planning and Assessment ($500K)
Expert assessment of the program direction, goals, and objectives, including analysis of the technical performance and content of contractual efforts.
Deployment of thermionic fuel element technology to U.S. industry ($1,000K)
Provide to industry, as government furnished equipment, the fabrication processes and technologies acquired under the TOPAZ program and contract for the duplication of such technologies and processes. Assess the ability of U.S. manufacturers to match the capabilities of the Russian Institutes to take selected technologies to the production stage, including the control of quality in the manufacturing process.
Research and Development on U.S. Technology ($5,000K)
Develop a technology development roadmap that includes a comparison of thermionic conversion to other conversion techniques in terms of efficiency, lifetime, and cost.

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Project AN - Thermionics (cont'd)

Develop a baseline knowledge of the current state of U.S. research in the field and compile a database detailing the capabilities of U.S. manufacturers and researchers.
Investigate basic physics of break-through oxygenation technologies to enhance thermionic converter efficiency.
Develop high voltage collector insulator coatings.
Investigate the possibility of producing conventional multi-cell thermionic converters that are testable in a non-nuclear environment.
Develop a multi-cell thermionic fuel element design that will allow loading of nuclear fuel immediately prior to launch rather than during early stages of manufacture and will allow for testing of the design using electric heat.
Develop designs for cesium reservoirs integral to individual thermionic fuel elements.
Develop improved moderator materials for moderated space nuclear power systems.
Develop improved instrumentation and control systems for space nuclear power systems.

Efforts to be conducted at the Thermionics Evaluation Facility, Albuquerque, NM ($500K)

Development of densified collector coatings through the sol-gel process.
Acquisition of technical expertise in the areas of inter-electrode gap physics and crystalline metal surface physics.

Thermionic converters for the Integrated Solar Upper Stage (ISUS) ($3,000K)

Completion of planar thermionic converter development for the existing Air Force Thermionics program.
Application of break-through oxygenation technologies to enhance thermionic converter efficiency for follow-on solar thermionic converters.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AX - TOPAZ International Program - Numerous recent studies have indicated a U.S. need for space nuclear power and propulsion technology options to support future space mission planning. The TOPAZ International Program is the only U.S. program capable of providing those technology options. The program was transitioned from the Ballistic Missile Defense Organization (BMDO) to the Defense Nuclear Agency (DNA) in FY95. As constituted under BMDO, the program focus was on test and evaluation of Russian space nuclear power hardware. As the program is transitioned to DNA, the program focus is being shifted to use the Russian hardware and associated facilities as a U.S. testbed for advanced space nuclear power technology. By working in cooperation with the Russian technicians who build the TOPAZ II space nuclear power system, U.S. technicians gain access to more than thirty years of experience in thermionic space nuclear power technology. Funding received by the Russians from the sale of the hardware to the U.S. is being used to fund the Russian defense conversion process.

In addition to work involving the Russian TOPAZ hardware and facilities (which use the thermionic power conversion process), this effort includes support for U.S. research both into thermionic as well as thermoelectric power conversion. Work is also included on space nuclear thermal and bimodal propulsion, under a project agreement being negotiated by the USAF with the French Ministry of Defense (MOD).

FY 1995 Accomplishments

Technology Transfer (Funding from BMDO in FY 95)

- Second Hardware Payment.
- Completed testing of path-finder TOPAZ unit designated Ya-21U at the New Mexico Engineering Research Institute (NMERI) facility.
- Installed sodium-potassium coolant fill and purification equipment at NMERI.
- Initiated acceptance testing of flight certifiable TOPAZ unit at NMERI.
- Prepared facility for testing of advanced (40 kw) thermionic fuel element at NMERI.
- Initiated cooperative study with French MOD on space tug.
- Developed transition plan and technology roadmap in support of new programmatic objective.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AX - TOPAZ International Program (cont'd)

FY 1996 Plans

Technology Transfer ($8,500K)

- Design and fabricate interelectrode gap physics test fixtures.
- Begin testing and evaluation of advanced (40 kw) thermionic fuel element.
- Prepare NMERI facility for application as thermionic test bed.
- Acquire Russian reservoir of cesium technology research.
- Initiate performance tests of flight certified TOPAZ unit at NMERI.
- Design advanced (60 kw) thermionic fuel element.
- Build thermionic fuel element pieceparts.
- Acquire single crystal fabrication stand.

FY 1997 Plans

Technology Transfer ($7,038K)

- Continue performance testing of flight certifiable TOPAZ at NMERI.
- Complete testing of advanced (40 kw) thermionic fuel element.
- Perform experiments on interelectrical gap physics.
- Evaluate thermionic fuel element pieceparts.
- U.S. fabrication of single crystal electrodes.
- Evaluate Russian cesium reservoir technology.
- Post test exam of (40 kw) thermionic fuel element.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE March 1996
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

Project AY - Bioenvironmental Hazards Research - This project provided for research on bioenvironmental hazards of specific DoD concern. Areas of research include remediation, human health effects and risk evaluation, pollution prevention, waste stream treatment, and impact assessment of atmospheric emissions. Funds were provided as a Congressional addition in FY 1994, FY 1995 and FY 1996, and were intended to continue efforts begun by a grant in FY 1989 to Tulane and Xavier Universities.

FY 1995 Accomplishments
Selected research projects which will mitigate high priority defense-related bioenvironmental hazards. ($3,000K)

FY 1996 Plans
The emphasis of the research will be on the impact of environmental pollutants on human and ecological systems. Priority will be given to pollutants of particular concern to the defense community such as radioactive material, and chemical and biological warfare agents. Research will include disposal, detection, storage, separation, decomposition and environmental hazards. ($5,000K)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

B. Program Change Summary

	FY95	FY96	FY97
Previous President's Budget	218.9	219.0	230.7
Current Budget Submit/President's Budget	210.8	228.0	195.1

Change Summary Explanation:

The budget request supports a refocused investment strategy consistent with DNA's revalidated mission as defined in the new agency charter approved on 14 June 1995. The budget supports sustainment of DoD nuclear competence based on applications of DNA's technical and operational expertise that respond to proliferation threats and other national security priorities. Resource constraints have curtailed investment in new simulator technologies; halted damage assessment sensor development; and precluded the implementation of the Joint Staff-endorsed Combined Battlefield Environmental Effects program intended to provide more affordable protection against all electromagnetic and Nuclear, Biological and Chemical (NBC) hazards.

Another element of the refocused investment strategy is the establishment of program functions within DNA. These activities have been undertaken in response to the new DNA charter and to concentrate on uniquely identifiable activities that are important in the post-cold-war environment and that meet the needs of specific customers, usually one or more warfighters. Included in the program functions are: (1) The Counterproliferation Advanced Concept Technology Demonstration, for U.S. European Command and other warfighters; (2) Arms Control Verification Technology for Treaty Managers and the On-Site Inspection Agency; (3) Cooperative Threat Reduction supporting DoD activities to reduce and render safe the nuclear weapons and materials of the Former Soviet Union; (4) the Hard Target Tunnel Defeat program for Pacific Command, other warfighters, and the Services; and (5) Special Programs that include, for example, counterterrorism, the Electro-Thermal Chemical gun, and exploitation of Russian expertise in thermionics for space power. While funding for these customer-focused program activities is provided by Program Elements (PE)

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B. Program Change Summary (cont'd)

other than PE 0602715H the execution of the programs is fully dependent on the underlying work performed within PE 0602715H.

C. Other Program Funding Summary None.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

D. Schedule Profile

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AB (Test & Simulation Technology)												
Acquisition Milestones												
Acquire components for Technology Demo				X								
Acquire Debris Mitigation Technologies								X	X	X	X	X
Engineering Milestones												
Evaluate Non-Pulsed Power Nuclear Weapons Effects (NWE) Simulation Tools				X								
Demonstrate Pulsed Power Components for NWE								X				
Demonstrate Debris Mitigation												X
Design reviews for communications/Radar NWE simulators		X		X		X	X					
T&E Milestones												
Test Pulsed Power Simulator Components								X				
Test Debris Mitigation Schemes										X		
Initial Operational Capability of Communications/Radar NWE simulators												X X
IOC Non Ideal Airblast Simulator							X					
Other Program Events												
Construct burster slab for penetration & fuze evaluation tests				X								
Build 1/2 scale structures for collateral effects & wall-failure testing						X	X					
Construct target for GBU-28 operation test & evaluation		X	X									
Execute protective design tests (Dipole Gate)								X				

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AB (Test & Simulation Technology)												
Other Program Events												
Execute antipenetration tests					X							X
Execute enhanced warhead tests							X					X
Construct large test structure				X								X
Construct hard target 3												X
Initiate Large Blast/Thermal Simulator (LBTS) Final Blast Shock Operational Capability						X						
Integrate thermal test operation into the test capability at LBTS					X							
Execute Army M-1 tank test requirements in LBTS							X					
Execute Navy thermal test requirements at TRS site & Tri Ser Fac					X							
Joint DNA-Army non-ideal blast testing program for LBTS upgrade (P3I)						X	X	X				
Initiate plans for simulator facility closure					X							
Dismantlement of simulators				X	X	X	X	X		X	X	X
Equipment relocation	X	X	X	X	X	X	X	X		X	X	X
Ion beam capability assessment	X	X	X	X								
Optimize simulator debris shields	X	X	X	X								X
Cold x-ray simulation, multiline PRS capability implementation							X					
DECADE fabrication & IOC				X	X	X	X	X				
DECADE customer orientation								X		X		
Completed fully dynamic display sensor nuclear weapons effects simulator demonstration							X					
Operational testing of universal modem with Nuclear Effects Link Simulator and Advanced Channel Simulator							X				X	
Operability assessments of C4I/Radar Systems					X	X				X	X	X
Conduct HWIL testing IR scene and nuclear effects									X			

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AC (Weapon Systems Lethality)												
Other Program Events												
Complete Munitions Effects Assessment Prototype			X									
Executed tests in Support of the Joint Munitions Effectiveness Manual							X					
Validate adaptive refinements of structural dynamics code							X					
Validate Munitions Effects Assessment							X					
Validate coupled codes							X					
Support Battle Damage Assessment Sensors/demo							X					
Coil-gun research complete												
Complete weather & transport model			X				X				X	
Conduct precision model shock/bubble assessment test						X						
Complete discrete elements structural boundary model							X					
Start Computer Aided Design Interface							X					
Begin long range gun development for NSFS follow-on												
Complete advanced fluid/structural codes												
Conduct live fire demonstration										X		
Complete advanced fluid/structural codes											X	
Fabricate prototype high energy density capacitors							X					
Desing and fabricate full scale high energy density capacitors											X	

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AC (Weapons Systems Lethality)												
Other Program Events												
Conduct live fire demonstration												X
Wind Tunnel Test of Flight Body for 5" Naval Gun							X					
Electromagnetic Sabot-Launched Electric Kinetic Energy (SLEKE) projectile tests for Army												X
Fabricated four long pulse High Power Microwave (HPM) 10 kW sources			X									
Completed one breadboard flux compression generators												X
Complete long pulse HPM megawatt class source												X
Begin joint laboratory tests with U.S. Navy using 10 kW HPM source										X		
Begin alternate source development							X					
Begin to explore HPM associated technology for Command and Control Warfare (C^2W)							X					

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AE (Weapon Safety & Operational Support)												
Other Program Events												
Automated Routing & Maintenance System	X	X	X	X	X	X	X	X	X	X	X	X
NATO Nuclear Planning System Transition	X	X	X	X								
Synthetic Exercise Environment	X	X	X	X	X	X	X	X	X	X	X	
Hazardous Prediction Integration System	X	X	X	X	X	X	X	X	X	X	X	X
Minuteman III/W78 Refined	X	X	X	X	X	X	X	X	X	X	X	X
B52	X	X	X	X	X	X	X	X	X			
Fuel Fire	X	X	X	X	X	X	X	X	X			
Propellant Sensitivity	X	X	X	X	X	X	X	X	X			
Fire Resistant Enhancement (Second Phase)	X	X	X	X	X							
Long-term storage					X	X	X	X	X	X	X	X
Major System Assessment									X	X	X	X
Ground Based Jammer	X	X	X	X	X	X	X					
Navy Aircraft Defense System	X	X	X	X	X	X	X					
Survivability Integration Initiated				X	X	X	X	X	X	X	X	
Continue survivability integration program												X
Initiate survivability integration demonstration program as follow-on											X	
Laser Countermeasures	X	X	X	X	X	X						
Modeling & Simulation Initiatives		X	X	X	X	X	X	X	X	X	X	X
NATO Nuclear Planning System PC Trainer	X											X
Automated Nuclear Weapons Training Program	X	X	X	X	X	X	X	X	X	X	X	X
Counterproliferation Awareness Course	X	X	X	X	X							
Sustaining Nuclear Operational Training Expertise					X	X	X	X	X	X	X	X

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AF (Weapon Systems Operability)												
Acquisition Milestones												
Deliver design tool analysis capability-based on AGT/UGT radiation testing			X				X					
Develop and deliver First-of-a-Kind Non-Upsettable System Design Guidelines						X						
Deliver Hardware-in-the-Loop (HWIL) Testbed for protocol validation							X					
Complete interceptor sensor demonstration using HWIL for protocol validation												X
Delivered Preliminary Design Rulebook for Sensors		X										
Other Program Events												
Complete anti-emetic drug recommendation for NATO								X				

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AF (Weapon System Operability)												
Other Program Events												
Developed environments models for sensors for Theater Missile Defense & space surveillance system												
- IR sensor environments models for Theater High Altitude Air Defense (THAAD)	X											
- Assessed nuclear operability issues for Space-Based Infrared Research Satellite System Sensor							X					
- Ground based radar model for Theater Missile Defense systems			X									
Develop Executive Level Software (ELS) communications connectivity Program												
- Delivered "beta" version of ELS to STRATCOM			X									
- Deliver final version of ELS to STRATCOM												X
Completed initial radiation resistant cryogenic silicon-on-insulator technology assessment required for space-based sensors			X									
Successfully field-tested pulsers required for High-Altitude Electromagnetic Pulse (HEMP) testing	X											
Deliver prototype radiation-hardened 1-megabit Static Random Access Memory (SRAM)										X		

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AF (Weapon System Operability)												
Other Program Events												
Conduct Testable Hardware Demonstrations for Design and Test Protocols												X
Correlate AGT and UGT data for Electronic Systems in a configuration-controlled electronics database							X					
Develop and deliver Preliminary Guidelines for Improved Testable Hardware Testing					X							
Collected & correlated Material & Optical Data from all sources from relevant UGTs & AGTs			X									
Deliver first combined correlation study of optical materials							X					
Design preliminary test coupon for optical coating							X					
Demonstrate draft protocols for optical materials										X		X
Develop & deliver First-of-a-Kind testing Technology for High Throughput Sensor System							X					

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	R-1 ITEM NOMENCLATURE Defense Nuclear Agency; 0602715H

D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AG (Scientific Computations & Information Systems)												
Other Program Events												
Disseminate Science and Technology Digest		X				X			X		X	
DASIAC site merger			X									
Data archival incremental deliveries			X				X					X
DARE data loading						X	X	X	X	X	X	X
Disseminate Computational Aids	X	X	X	X		X		X		X		
Disseminate "Effects of Nuclear Weapons"												X
Distribute Effects Manual-1		X										
Provide supercomputing resources to researchers	X	X	X	X	X	X	X	X	X	X	X	X
Migration to new supercomputing facility									X	X	X	X
Full Defense Research & Engineering Network (DREN) capability	X											
Upgrade tail circuits/hubsite			X			X		X			X	
Upgrade peripheral hardware							X	X	X			X
Distribute NATO version of Effects Manual-1					X							
Distribute Effects Manual-1 Technical Handbook											X	

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project AI (Hard Target Tunnel Defeat & NTS Sustainment)												
Other Program Events												
Design Tunnel Target Test Facility	X											
Construct Tunnel Target Test Facility		X			X	X	X	X	X			
Characterize Tunnel Target Test Facility					X	X	X	X		X		
Conduct Explosive Safety Tests											X	
Equipment Installation		X										
Conduct Dipole Hail Tunnel Vulnerability Tests							X	X	X			
Conduct Attack Planning										X		
Conduct Portal Damage Tests U16a										X	X	X
Conduct Portal Closure Tests U12u											X	
Conduct Operational Vulnerability Tests						X					X	

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D. Schedule Profile (cont'd)

	FY 1996 1	2	3	4
Project AM - (Counterterrorist Explosives Research)				
Other Program Events				
Assess threats		X		
Summarize assessment				X
Catalog and assess existing models	X			
Adapt/apply selected tests				X
Conduct selected tests			X	
Review tagging methods		X		
Identify tagging improvements			X	

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D. Schedule Profile (cont'd)

	FY 1996				FY 1997			
	1	2	3	4	1	2	3	4
Project AN - Thermionics								
Planning and Assessment								
Management Plan	X							
Program Plan		X						
Technology Assessment			X					
Deployment of TFE technology to U.S. industry								
Reopen BAA		X						
Industry Brief			X					
Research and Development on U.S. technology								
Statements of Work		X						
Request for Proposals			X					
Thermionic Convertors for ISUS								
Statements of Work		X						
Transfer of funds to Phillips Lab		X						

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Advanced Technology Development - BA3	R-1 ITEM NOMENCLATURE Verification Technology Demonstration; 0603711H

COST *(In Millions)*	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	Cost to Complete	Total Cost
Total 0603711H Cost	34.4	32.5	26.2	29.3	30.5	31.3	32.8	Continuing	
Project CA Strategic Arms Control Technology	8.0	10.9	8.6	9.1	10.9	11.3	11.4	Continuing	
Project CB Conventional Arms Control Technology	13.3	9.3	10.4	10.1	8.2	8.2	8.4	Continuing	
Project CC Chemical Weapons Convention	13.1	12.3	7.2	10.1	11.4	11.8	13.0	Continuing	

A. Mission Description and Budget Item Justification - This Defense Nuclear Agency (DNA) program element covers verification and compliance RDT&E for arms control treaties. The funded projects conform to requirements presented and approved by the Office of the Under Secretary of Defense (Acquisition & Technology) through the DoD Arms Control Requirements Assessment Board (RAB) process and described in the program plan for RDT&E for Arms Control Technology. RDT&E for Arms Control treaties include: the Treaty on the Reduction and Limitation of Strategic Offensive Arms (START); the Treaty on Further Reduction and Limitation of Strategic Offensive Arms (START II); the Anti-Ballistic Missile (ABM) Treaty, Intermediate-range Nuclear Forces (INF) Treaty, Conventional Armed Forces in Europe (CFE) Treaty; the Open Skies (OS) Treaty, the Convention on Conventional Weapons (CCW); Chemical Weapons Convention (CWC), Comprehensive Test Ban Treaty (CTBT);

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Advanced Technology Development - BA3	R-1 ITEM NOMENCLATURE Verification Technology Demonstration; 0603711H

Mission Description and Budget Item Justification (cont'd) - Presidential arms control initiatives; and other existing and emerging arms control related agreements, treaties, and initiatives, such as the Organization on Security and Cooperation in Europe's Vienna Document 94 (VD-94) and its Global Exchange of Military Information (GEMI). Furthermore, it conforms to the Administration's Research and Development priorities as related to both conventional arms control, and weapons of mass destruction arms control, and disarmament. Verification technologies are critical for enabling the U.S. to detect, monitor, verify and implement international arms control treaties and other agreements whose purpose is to prevent the proliferation of nuclear, chemical, biological, and other advanced weapons. Technical assessments are made to provide the basis for sound project development and to evaluate existing programs. Technology developments are conducted to ensure that capabilities to detect, monitor, verify and implement treaties and agreements are available when required.

The program includes development of equipment and procedures for data exchanges, on-site and aerial inspections and monitoring, and other confidence-building measures. In addition, assistance is provided to the Office of the Secretary of Defense in preparing for U.S. compliance with treaty obligations. Work is also being done to assess the susceptibility of a CTBT verification regime to evasive measures. Results will be used by the CTBT negotiators to develop a technically robust International Monitoring System (IMS). Hardware and procedures developed are transitioned to the On-Site Inspection Agency (OSIA), or appropriate international inspectorate, as in the case of the CWC, for use in conducting treaty mandated inspection and monitoring and for implementing transparency and confidence-building regimes.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Advanced Technology Development - BA3	R-1 ITEM NOMENCLATURE Verification Technology Demonstration; 0603711H

Mission Description and Budget Item Justification (cont'd) - Where applicable, RDT&E to meet requirements in one treaty area is applied to fulfill requirements in other areas to eliminate duplication of efforts. For example, development of gravity gradiometers for future START Treaty verification applications are also being evaluated for detection of clandestine underground facilities. The technologies and procedures developed in DNA's arms control verification technology program provided an invaluable source of information on equipment and procedures that was extensively used by a DNA team to support an interagency assessment of Long Term Monitoring of Iraq. The results were presented to the United Nations Special Commission (UNSCOM) on Iraq and are being used to implement the provisions of United Nations Resolution 715.

DNA's synergistic approach to fulfilling arms control requirements has been maximized in data management development. Arms control treaties require extensive exchanges of data concerning treaty accountable items, initial declarations, movements, etc., by signatory nations. DNA has developed a treaty information management system, the Compliance Monitoring and Tracking System (CMTS), to accommodate these data exchanges and monitor U.S. compliance with treaty data reporting provisions. The CMTS provides treaty required data exchanges for INF, START, CFE and Confidence- and Security-Building Measures. A modification to upgrade CMTS to meet START II requirements is underway and capabilities to transmit CWC required data are being developed. The Open Skies Notification System is being developed to support a FY1996 treaty entry-into-force (EIF). DNA will transition operational control of the CMTS to OSIA in a phased approach starting with Data Management/Notification System (DMNS) and START Central Data System (SCDS) in FY1997.

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Mission Description and Budget Item Justification (cont'd) - The Chemical Weapons Convention Information Management System (CWCIMS) has been offered to the Preparatory Commission at the Hague by the United States Government (USG). The Commission has accepted the U.S. offer and the level of continued U.S. support is being negotiated.

Project CA - Strategic Arms Control Technology - This project consists of RDT&E activities required to implement U.S. rights under the Strategic Arms Reduction Treaty (START), START II, Comprehensive Test Ban Treaty (CTBT), Anti-Ballistic Missile (ABM) Treaty, Intermediate-range Nuclear Forces (INF) Treaty and Missile Technology Control Regime (MTCR); to assist the United States Government (USG) and industry in compliance with the treaties; and to develop technology to meet requirements of future nuclear arms control agreements. The funded projects conform to requirements presented and approved by the Office of the Under Secretary of Defense (Acquisition & Technology) through the DoD Arms Control Requirements Assessment Board (RAB) process and described in the program plan for RDT&E for Arms Control Technology. The START Central Data System (SCDS), as part of the Compliance Monitoring and Tracking System (CMTS), enables the U.S. to generate treaty required notifications, perform treaty compliance assessments, and to transmit notifications to Treaty states. The START II Treaty, signed in January 1993, requires inspections of converted SS-18 silos and authorizes additional re-entry vehicle on-site inspections of ICBMs installed in the converted silos. Tools developed by this program will enable the USG to effectively exercise treaty inspection rights. Technology development efforts are planned to support anticipated future treaty requirements

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Project CA - Strategic Arms Control Technology cont'd - in the most non-intrusive and cost-effective manner. Future strategic arms control regimes may consider non-deployed warheads and Special Nuclear Material (SNM) stockpiles, which would necessitate observing warheads in all phases, to include conversion and/or elimination and would require the development of new procedures and equipment to accomplish the monitoring task. The primary focus of the efforts are on more effective methods of measuring characteristic Treaty Limited Item (TLI) signatures with technologies such as gravity gradiometry, and providing monitoring/inspection capabilities to ultimately reduce cost and increase the flexibility of U.S. inspectors. Also included in this project are efforts to assess the susceptibility of a Comprehensive Test Ban Treaty (CTBT) verification regime. The CTBT will prohibit all nuclear testing, regardless of time or place. CTBT negotiators began in the Conference on Disarmament (CD) in January 1994, with the 38 member countries of the CD as the main participants and 51 countries attending as "Observers". Requirements continue to be defined as the negotiating nations reach consensus on various aspects of the overall verification regime and an International CTBT Organization. With entry-into-force (EIF) expected to occur late CY 1998/early CY 1999, RDT&E is needed for required activities to implement U.S. rights under the CTBT. The verification regime will be established to assist in the deterrence and detection of activities that are not consistent with the provisions of the treaty. The regime will include an International Monitoring System (IMS), on-site activities, and associated (or confidence-building) measures, and an International CTBT Organization.

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Project CA - Strategic Arms Control Technology cont'd - Overall RDT&E requirements and implementation timelines are dependent on the desired robustness and implementation schedule for the various components of the verification regime. RDT&E must commence now to ensure that monitoring and inspection systems are available at EIF and negotiators have the technical information to make informed decisions on key issues.

FY 1995 Accomplishments

Implementation and Compliance ($4.4)

- Achieved CMTS SCDS START Initial Operational Capability.
- Provided technical and engineering support to the Office of the Under Secretary of Defense (Acquisition & Technology)/Arms Control Implementation & Compliance (OUSD(A&T)/ACI&C) for treaty compliance assessments and planning.
- Provided technical and engineering support to Joint Compliance and Inspection Commission (JCIC) and Bilateral Implementation Commission (BIC).
- Completed analysis and report on the Proliferation of Former Soviet Union Missile Components.

Technical Assessments ($.5)

- Maintained the Technical On-Site Inspection (TOSI) Site testing facility.
- Initiated assessments of proposed International Monitoring Systems for CTBT (via adversarial analysis methodology).

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FY 1995 Accomplishments (cont'd)

Improvements ($1.6)

- Completed demonstration of Adjunct Monitoring System that will be the backbone of future unattended monitoring capabilities.

Technology Development ($1.5)

- Completed mathematical model to support discrimination of nuclear warhead reentry bodies on a submarine launched ballistic missile through the closed hatch of a nuclear submarine.
- Demonstrated capabilities of the Authenticated Monitoring and Tracking System.
- Completed development of a fieldable prototype gravity gradiometer system.
- Initiated requirements analysis for an arms control related Universal Data System.
- Investigated feasibility of object pattern recognition concepts using Russian algorithms to assist inspectors in identification of TLI's.
- Completed development and testing of Innovative Treaty Sensor Integration Project which provides a computer assisted inspection aid for use during inspections of treaty limited items.
- Developed and tested measurement capability to verify that converted SS-18 silos

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FY 1995 Accomplishments (cont'd)

only contain SS-25 size missiles.

- Initiated U.S. Naval Academy (USNA) research for development of a high efficiency, light-weight neutron detector.

FY 1996 Plans

Implementation and Compliance ($3.9)

- Continue CMTS SCDS START development and testing to satisfy treaty requirements.
- Incorporate START II data reporting requirements into CMTS SCDS.
- Initiate development of START Notification Front-End System (NOFES) to facilitate Nuclear Risk Reduction Center (NRRC) data transmission.
- Provide technical and engineering support to OUSD(A&T)/ACI&C for treaty compliance assessments and planning.
- Provide technical and engineering support to START Treaty commissions (JCIC/BIC).
- Reinstitute START Special Access Visit (SAV) procedure and guideline development for government agencies and contractor facilities.
- Initiate development of a CTBT decision making simulation using realistic inputs from monitoring systems, subsequent analyses, and advisors.
- Conduct impact analyses of proposed provisions for on-site activities and associated (or confidence building) measures for CTBT.
- Identify equipment required to support and/or host inspections and visits under the CTBT verification regime.
- Initiate development of equipment required by CTBT protocols.

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FY 1996 Plans (cont'd)

Technical Assessments ($2.2)

- Complete TOSI closeout/transfer of control.
- Conduct ABM/Theater Missile Defense (TMD) interceptor technical assessment.
- Conduct TLI detection, identification and tracking assessment.
- Continue assessments of proposed International Monitoring Systems for CTBT (via adversarial analysis methodology).
- Evaluate first year START implementation technical activities and achievements for OUSD(A&T)/ACI&C.

Improvements ($.9)

- Complete development of a remote, unattended, corral monitoring system to supplement on-site inspections.

Technology Development ($3.9)

- Conduct gravity gradiometer prototype field trials.
- Conduct gravity gradiometer modeling and simulation data verification analysis.
- Continue analysis of Russian algorithm application for motion detection in support of Object Pattern Recognition sensors.
- Complete development of the Authenticated Monitoring and Tracking System.
- Conduct advanced research efforts for Light-Weight Neutron Detector, Micro-power Impulse Radar, Underground Facility Modeling, Raman Lidar, and Multifunction Synthetic Aperture Radar.

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FY 1997 Plans

Implementation and Compliance ($3.0)

- Complete CMTS SCDS documentation and transition system to OSIA.
- Incorporate future START/START II/post-START II/etc. data exchange revisions into CMTS.
- Provide technical and engineering support to OUSD(A&T)/ACI&C for treaty compliance assessments and planning.
- Provide technical and engineering support to START Treaty commissions (JCIC/BIC).

Technical Assessments ($.4)

- Research technologies to support post-START II requirements to monitor mobile delivery systems, non-deployed nuclear weapons and delivery systems and warhead inventories.

Technology Development ($5.2)

- Complete prototype gravity gradiometer system field trials and technical data package.
- Complete gravity gradiometer modeling and simulation data verification analysis.
- Develop Object Pattern Recognition prototype using Russian algorithms approach to motion detection.
- Initiate modification/enhancement/development of ABM/TMD computer analysis models.
- Initiate system concept, design concept, and prototype technology development for detection, identification and tracking of ABM treaty related TLI's.
- Improve existing and emerging technologies for nuclear materials detection and identification, and non-damaging imaging and detection of underground targets.

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Project CB - Conventional Arms Control Technology - This project covers RDT&E required to meet on-site and aerial monitoring, transparency, and confidence-building technology requirements; ensure compliance; and implement existing, emerging, and potential treaties, agreements, and initiatives related to conventional arms control (CAC). The funded projects conform to requirements presented and approved by the Office of the Under Secretary of Defense (Acquisition & Technology) through the DoD Arms Control Requirements Assessment Board (RAB) process and described in the program plan for RDT&E for Arms Control Technology. Relevant agreements which require continuing RDT&E support include: (1) the Conventional Armed Forces in Europe (CFE) Treaty, (2) Open Skies (OS) Treaty (projected Entry-Into-Force FY1996); (3) the Organization for Security and Cooperation in Europe (OSCE) Confidence- and Security-Building Measures (CSBMs) contained in Vienna Document 94 (VD-94), to include the Global Exchange of Military Information (GEMI) signed in December 1994, and (4) the United Nations Transparency in Armaments (TIA) Agreement established in 1993. The RDT&E needs for emerging treaty and agreement areas include: (1) the OSCE Review Conferences, with its OSCE Forum for Security Cooperation; (2) the CFE Review Conference and possible follow-on negotiations; (3) regional/sub-regional arms control and peacekeeping to include RDT&E arms control implementation support for the Dayton Agreement and conventional arms proliferation issues; (4) enhancing Confidence- and Security-Building Measures, and (5) Convention on Certain Conventional Weapons (CCW) and the Anti-Personnel Land Mine Control Program (APLCP). This project develops hardware, software and technical applications to support on-site and other inspection modes, Open Skies overflights and data management supporting the increasing requirements for arms control information exchanges and notifications such as the Data Management and

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Project CB - Conventional Arms Control Technology (cont'd) - Notification System (DMNS) for CFE and VD-94, the Open Skies Notification System (OSNS), TIA, and GEMI, and APLCP.

FY 1995 Accomplishments

Implementation and Compliance ($13.0)

- Continued Open Skies Management and Planning System (OSMAPS) independent validation and verification in conjunction with OSMAPS software development.
- Delivered transportable OSMAPS Transportable Operational Planning System (TOPS).
- Delivered first prototype Data Annotation, Recording, and Mapping System (DARMS) unit to US Air Force for installation on Open Skies aircraft.
- Delivered prototype Synthetic Aperture Radar (SAR) to the U.S. Air Force for installation on the U.S. Open Skies aircraft.
- Delivered a SAR fixed site processing system architecture to the U.S. Air Force to meet treaty data processing requirements.
- Completed CFE Data Management/Notification System and Open Skies Notification System (OSNS) DOS to Windows transition.
- Integrated the Open Skies Notificaiton System (OSNS) and Data Management System (DMS) as a subsystems into the Data Management and Notification System.
- Provided CMTS/DMNS hardware/software support to users.
- Provided technical support to Open Skies Consultative Commission (OSCC) and preparations for FY1996 CFE Review Conference, the OSCE, and the CCW Review Conference.
- Developed software requirements/techniques and protocols to permit input, storage,

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FY 1995 Accomplishments (cont'd)

analysis, output formatting, transmission, and transfer of arms holdings (information for the United Nations TIA regime and the OSCE GEMI).

- Defined technology requirements for new classes of sensors or modifications to existing sensors for Open Skies implementation.

Technical Assessments ($.1)

- Completed an assessment of advanced sensor and information processing for safe havens and barriers in peacekeeping operations and briefed Supreme Headquarters Allied Powers Europe (SHAPE) on the results.
- Identified verification technologies for U.S. implementation of and compliance with provisions of emerging conventional arms control, confidence- and security-building, and peacekeeping regimes.

Improvements ($.2)

- Developed an automated treaty limited equipment (TLE) identification aids system for OSIA for use in CFE.

FY 1996 Plans

Implementation and Compliance ($8.9)

- Deliver OSMAPS observation flight planning auto-router capabilities.
- Deliver portable SAR image processing systems.
- Flight test Synthetic Aperture Radar Open Skies (SAROS) in Open Skies aircraft.
- Deliver SAROS systems 2 and 3 to U.S. Air Force.

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FY 1996 Plans (cont'd)

- Determine portable/aerial standoff gamma/x-ray detection capabilities.
- Continue transition of OSMAPS capabilities to users and provide operational support.
- Continue OSMAPS independent validation and verification.
- Develop capabilities to assist in ensuring DoD compliance with emerging or evolving verification and monitoring regimes (e.g., CCW), and regional arms control requirements.
- Provide technical support to OSCC; the FY1996 APLCP negotiations, the Joint Consultative Group, CFE Review Conference, and VD-94; prepare for the OSCE Review Conference.
- Support delivered prototypes, e.g., SAR, SAR Processing System (SARPRO), TOPS), and DARMS until systems are transitioned to operating organizations.
- Deliver automated collection and reporting system to meet U.S. TIA and GEMI obligations.
- Provide technical support for SAR data standardization and implementation of the fixed site SAR processor.
- Complete DMNS documentation.
- Develop CFE and CSBM (VD-94) Notification Front End System (NOFES) to comply with international data structures for Nuclear Risk Reduction Center (NRRC) data transmission.
- Continue analysis of new classes of sensors to support aerial observation regimes.

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FY 1996 Plans (cont'd)

Technical Assessments ($.3)

- Assess verification technologies required for emerging or evolving treaty areas such as the CCW's (APLCP).

Improvements ($.1)

- Complete delivery of an automated TLE identification aids system to OSIA.

FY 1997 Plans

Implementation and Compliance ($8.9)

- Complete delivery of all baseline OSMAPS capabilities and ensure the system complies with all changes to the Open Skies regime.
- Complete OSMAPS independent validation and verification.
- Provide technical support to the OSCC, the Joint Consultative Group (JCG), the Forum for Security Cooperation, and prepare for the FY1998 OSCE Review Conference.
- Complete support of delivered prototypes, e.g., SAR, SARPRO, TOPS, DARMS, TIA/GEMI, and TLE ID.
- Continue to develop technologies to assist in ensuring U.S. compliance with emerging or evolving arms control requirements (e.g., CCW).
- Provide technical support for SAR data standardization and implementation of fixed site SAR processor.
- Initiate development of an extended digital processor to comply with Open Skies media transfer requirements.
- Complete development of CFE and CSBM (VD-94) Notification Front End System (NOFES) and integrate it into DMNS.

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FY 1997 Plans (cont'd)
- Complete analysis of new classes of sensors for modification of the Open Skies regime.
- Transition operational control of DMNS to OSIA.
- Continue analyses of new classes of sensors to support aerial observation regimes.

Technical Assessments ($.9)
- Conduct assessments of technologies to support on-going or emerging conventional arms control negotiations (e.g., CCW).
- Initiate development of database management tools for interface with U.S. and international arms control databases.
- Conduct technical assessments of regional arms control needs for Central and South America and South Asia.
- Develop capability to ensure consistency of data reported by USG under existing and future treaties and agreements.

Improvements ($.6)
- Initiate development of prototype sensors for enhanced/upgraded Open Skies sensor suites, as allowed in the treaty.

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Project CC - Chemical Weapons Convention (CWC) Technology - This project conducts verification technology RDT&E to fulfill requirements of all chemical and biological arms control agreements. The primary focus has been preparing for multinational verification of, and U.S. compliance with, the Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on their Destruction (CWC). States Parties to the CWC undertake a treaty obligation to ensure that the Organization for the Prohibition of Chemical Weapons (OPCW) has the technology to verify compliance with the CWC through the implementation of on-site inspection verification protocols. This DNA project will provide the U.S. contribution to the preparation process enabling the OPCW to institute a meaningful inspection program and continue to meet treaty obligations following ratification. Technologies developed through this program also support the chemical Bilateral Destruction Agreement and international peacekeeping efforts such as the UN Special Commission of Iraq. Additionally, this project outlines the RDT&E program required to support biological weapons arms control. The primary focus for this area is to develop RDT&E products to assist U.S. policy makers and negotiators in their efforts to strengthen the BWC. RDT&E is essential to U.S. negotiators in the multilateral arena both in preparation for and subsequent to the 1996 BWC Review Conference (RevCon). The RevCon, which is scheduled for December 1996, has the goal of developing measures to strengthen compliance with the BWC. RDT&E is necessary to support U.S. policy makers by analyzing and prioritizing proposed confidence-building measures. Post RevCon RDT&E will be essential in continuing this process and ensuring confidence-building is balanced against the need to protect legitimate U.S. equities.

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Project CC - Chemical Weapons Convention (CWC) Technology (cont'd) - RDT&E also plays a crucial role in the on-going series of exchange visits among the U.S./UK/Russia. The 1992 Trilateral Statement was developed in attempt to resolve ambiguities in compliance with the BWC as well as to promote openness on legitimate programs. The U.S. has been negotiating a "Rules of the Road" document to delineate steps for up-coming visits. RDT&E projects assist in addressing technical aspects of this document while providing negotiators with the technical background essential to the conduct of resulting visits.

FY 1995 Accomplishments

Implementation and Compliance ($9.4)

- Provided developmental support for inspector training course and conducted specialty pilot course.
- Provided test and evaluation of recommended inspection equipment and procedures.
- Completed development of the definitive CWC Information Management System (CWCIMS).
- Continued development of a DoD automated system for exchange of CWC data.
- Provided technical support to the CWC Preparatory Commission.
- Completed development of a provisional modular laboratory for on-site sampling and analysis.
- Continued development of on-site analytical methods.
- Provided treaty support to OSD (Policy) in preparing for an up-coming series of exchange visits under the Trilateral Statement.

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FY 1995 Accomplishments (cont'd)
- Developed U.S. Army Implementation Plan for Trilateral visits.
- Provided support to OSD and Interagency in preparation for a BWC National Trial Visit.

Technical Assessments ($2.2)
- Developed operational concepts for the large volume air sampling applications that could fulfill future non-proliferation requirements.
- Validated on-site analytical methods and evaluated portable analytical equipment.
- Provided technical and treaty support to the site-assistance and mock visit process in preparation for Trilateral visits.
- Developed guidelines for national trial visits under the BWC.
- Provided technical support in developing a BW Implementation Office at Fort Detrick, Maryland.

Improvements ($1.1)
- Continued development of a portable ion-trap mass spectrometer to improve identification of chemical components.
- Initiated development of a flow injection trace gas analyzer for lewisite monitoring.
- Completed test and evaluation of the prototype handheld gas chromatograph.

Technology Development ($.4)
- Continued development of Swept Frequency Acoustic Interferometry for Non-Destructive Evaluation (NDE) of sealed containers.

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FY 1996 Plans

Implementation and Compliance ($7.0)

- Continue development and documentation of a DoD automated system for exchange of CWC data.
- Deliver Chemical Weapons Convention Information Management System (CWCIMS) to the Organization for the Prohibition of Chemical Weapons (OPCW).
- Continue test and evaluation of recommended inspection equipment and procedures.
- Continue development and improvement of on-site analytical methods.
- Complete testing of Series 1 Modular Laboratory.
- Complete development of NDE systems.
- Provide technical support to OSD (Policy) and U.S. Delegation to the PrepCom in developing criteria, recommendations, procedures and guidelines to establish the U.S. position on and responses to issues raised concerning verification/implementation provisions of the CWC.
- Provide technical and treaty support to OSD (Policy) on issues related to strengthening the BWC, including preparation and conduct of National Trial Visits, support to activities preparing for the 1996 RevCon, and support to the negotiation process.
- Provide technical and treaty support to OSD (Policy) on issues related to the Joint Statement of U.S./UK/Russia on Biological Weapons.
- Provide technical support to the Biological Arms Control Treaty office.

Technical Assessments ($2.8)

- Continue validation of on-site analytical methods and evaluate portable analytical equipment.

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FY 1996 Plans (cont'd)
- Assess historical U.S. offensive biological weapons information for inclusion in the biological weapons database.

Improvements ($1.4)
- Initiate engineering development of an improved Series II modular laboratory.
- Complete development of a prototype flow injection trace gas analyzer for lewisite monitoring.

Technology Development ($1.1)
- Complete development of Swept Frequency Acoustic Interferometry technology.
- Adapt more advanced state-of-the-art spectroscopy technologies that can be used in instruments during on-site sampling and analysis.

FY 1997 Plans

Implementation and Compliance ($1.8)
- Conduct test and evaluation of new commercial-off-the-shelf (COTS) equipment for potentially including in the modular lab.
- Support OPCW inspection equipment/procedures test & evaluation.
- Continue development of on-site sampling and analytical methods.
- Continue technical support to OSD(Policy) to establish the U.S. position on and responses to issues raised concerning verification/implementation provisions of the CWC.

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FY 1997 Plans (cont'd)

Technical Assessments ($1.6)

- Continue validation of on-site sampling and analytical methods developed in DNA programs.

Improvements ($3.7)

- Initiate engineering development of the hand-held gas chromatograph chemical detector.
- Continue engineering development of the Series II modular laboratory.
- Evaluate emerging sampling, sample preparation, and analytical technologies as they become available.
- Initiate advanced NDE development program.

Technology Development ($0.1)

- Initiate a comprehensive program for filling OPCW identified on-site inspection technology gaps.
- Continue to adapt more advanced spectroscopy technologies that can be used in instruments during on-site sampling and analysis.
- Develop innovative sensing technologies for potential CWC verification applications.

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B. Program Change Summary

	FY1995	FY1996	FY1997
Previous President's Budget	36.0	33.9	31.9
Current President's Budget	34.4	32.5	26.2

Change Summary Explanation:

Reduced funding limits the program to minimal activities to meet technical development requirements.

C. Other Program Funding Summary. None.

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D. Schedule Profile

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CA (Strategic Arms Control Technology)												
Engineering Milestones												
Complete prototype design for Arms Control Verification Gravity Gradiometer (ACVGG)			X									
Complete TOSI closeout/transfer of control						X						
Complete ABM/TMD Interceptor Technical Assessment							X					
Complete Treaty Limited Item Detection, Identification and Tracking Technical Assessment							X					
Complete ACVGG development and tech data package											X	
T&E Milestones												
Initial Reentry Body On-site Inspection (RBOSI) calculations		X										

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CA (Strategic Arms Control Technology)												
Other Program Events												
START Central Data System (SCDS) Initial Operational Capability (IOC) for START			X									
SCDS IOC for START II						X						
Initial development of START Notification Front-End System (NOFES)					X							
SCDS documentation completed and system transitioned to OSIA									X			
Demonstrate prototype Object Pattern Recognition technology											X	
Demonstrate improved portable neutron detector											X	
Interagency review of initial assessment of proposed International Monitoring System for underground testing for CTBT										X		
Initial review of assessments of proposed International Monitoring System for other test environments for CTBT											X	

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CA (Strategic Arms Control Technology)												
Other Program Events (cont'd)												
Complete initial assessment of requirements for equipment to support and/or host inspections and visits										X		
Complete preliminary assessment of the utility and difficulty of collecting notifications and other confidence-building data from mining industry												X
Complete logic tree for events, processes, procedures, and constraints associated with CTBT										X		
Project CB (Conventional Arms Control)												
T&E Milestones												
Complete flight testing of SAROS and DARMS						X						
Other Program Events												
Deliver tool to On-Site Inspection Agency (OSIA) to plan sensor events for Open Skies Missions						X						

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CB (Conventional Arms Control)												
Other Program Events (cont'd)												
Deliver notifications tool to OSIA for Open Skies notification					X							
Deliver augmented climatological and ground feature models to OSIA							X					
Deliver notifications tool to OSIA for CFE/CSBM notifications							X					
Deliver automated collection and reporting system to meet the TIA and GEMI information reporting requirements to the Joint Staff						X						
Complete design of the extended digital processor												X
Update GEMI automated system to ensure compliance with Vienna Document 96										X		
Project CC (Chemical Weapons Convention)												
Engineering Milestones												
Completed prototype handheld gas chromatograph		X										

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CC (Chemical Weapons Convention)												
Engineering Milestones (cont'd)												
Developed prototype Lewisite detector			X									
Complete prototype development of Swept Frequency Acoustic Interferometry (SFAI)							X					
Completed engineering development of Series I Modular Lab			X									
T&E Milestones												
Complete T&E of portable handheld gas chromatograph			X									
Complete development, testing and installation of DoD National System						X						
Complete baseline T&E of Series I Modular Lab							X					
Complete T&E of prototype Lewisite detector							X					
Complete T&E of SFAI prototype											X	
Other Program Events												
Complete development of CWCIMS			X									
Deliver CWCIMS to OPCW			X									

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D. Schedule Profile (cont'd)

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Project CC (Chemical Weapons Convention)												
Other Program Events (cont'd)												
Transition on-site inspection systems which fill identified OPCW technology gaps												X
Complete technical support in preparation for BWC RevCon										X		
Complete site preparation support for BW trilateral exchange visits							X					